



# PHILIPS

LBB 1231

## SQ 20 AMPLIFIER - RANGE

Service Manual

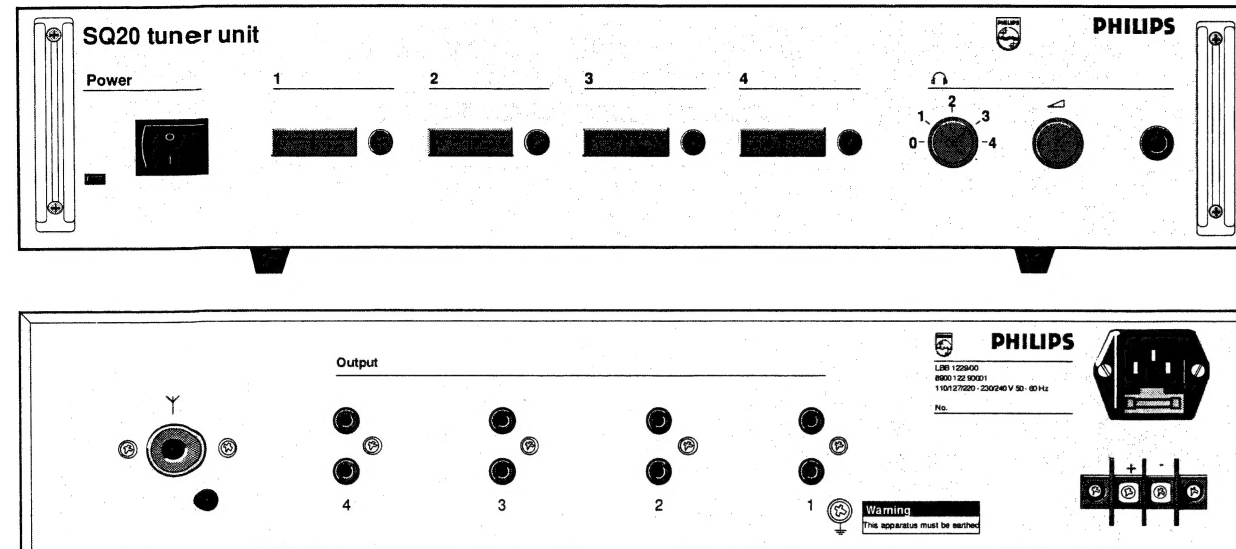


4822 733 24416  
900225

  
**CUSTOMER  
SUPPORT**

Service I.P.G. Prof. Audio  
Public Address Systems  
Industrial & Electro-acoustic Systems Division  
Nederlandse Philips Bedrijven B.V.

COPYRIGHT PHILIPS EXPORT B.V. - EINDHOVEN - THE NETHERLANDS 1991  
Printed in the Netherlands

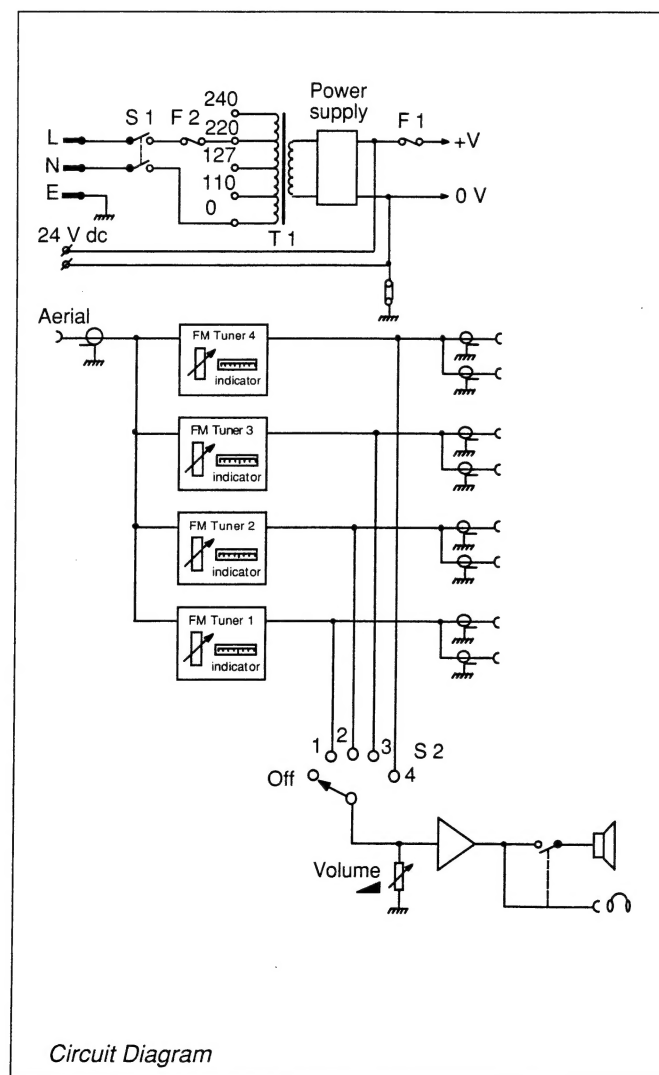


SQ 20 tuner unit (LBB 1229/00)

#### Technical data

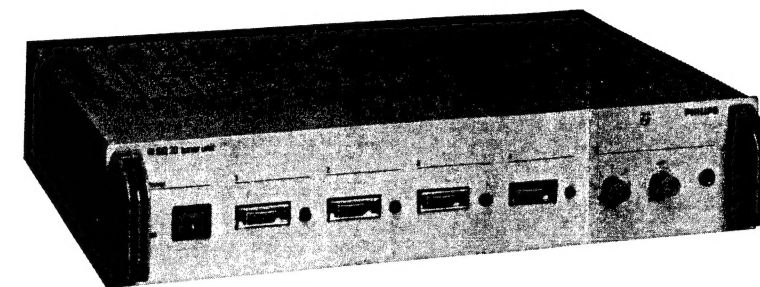
|                                   |  |
|-----------------------------------|--|
| Mains supply                      | 110, 127, 220 V $\pm 10\%$ and 230, 240 V $+6/-10\%$                 |
| At delivery                       | 50 or 60 Hz  |
| DC supply                         | 220-230 V<br>+24 V $-10/+20\%$<br>(0 V grounded)                     |
| Power consumption                 | 20 VA  |
| Outputs                           |  |
| Headphone output                  |  |
| - output signal                   | 3 V  |
| - output impedance                | 68 $\Omega$  |
| Tuner outputs (4)                 |  |
| - output signal                   | 1 V $\pm 1$ dB   |
| - output impedance                | < 200 $\Omega$   |
| FM tuner unit                     |  |
| - frequency range                 | 87.5 to 108 MHz  |
| - frequency response              | 40 Hz to 12 kHz $\pm 2$ dB   |
| - sensitivity                     | $\leq 4$ $\mu$ V at 26 dB signal-to-noise ratio and 75 kHz deviation |
| - signal-to-noise ratio at 40 kHz | $\geq 55$ dB   |
| - aerial impedance                | 75 $\Omega$  |
| Environmental conditions          |  |
| - ambient temperature             | rated range $-10$ to $+45$ $^{\circ}$ C                              |
| - storage temperature range       | $-40$ to $+70$ $^{\circ}$ C  |
| - relative humidity               | < 95%  |
| Dimensions                        |  |
| - height                          | 88 mm (100 mm including feet)  |
| - width                           | 440 mm (483 mm including 19" mounting brackets)                      |
| - depth                           | 308 mm (348 mm including handles)                                    |
| Weight                            | 6 kg   |
| Safety                            | according to IEC 65 and BS415  |

This product is manufactured to comply with the radio interference requirements of the Council Directive of 87/308/EEC.



## SQ 20 Tuner unit LBB 1229/00

- Contains four individual FM tuners.
- Tuning range from 87.5 to 108 MHz.
- Suitable for table-top or 19" rack mounting.
- Matches SQ 20 amplifier series cabinets.
- Built-in monitor loudspeaker with volume control.
- Complies with international installation and safety regulations.



The Philips SQ 20 range of high-performance audio amplifiers and compatible system accessories has been designed to meet the most demanding professional public address requirements.

#### SQ 20 tuner unit

The LBB 1229/00 tuner unit contains four separate FM-tuners, and is an ideal music source for hospital and hotel public address systems offering a choice of channels to each individual listener. Each tuner can be independently tuned over the full FM range (87.5 to 108 MHz) and has a tuning indicator calibrated in MHz and preset potentiometer tuning knob mounted on the front panel.

The output sockets are mounted on the rear panel, (two cinch sockets per tuner, although the output signal is mono), and a coaxial aerial socket is also included. Four screened stereo cables, each 1.5 m long and terminated at both ends with one red and one black cinch

connector, are supplied with the tuner unit for connecting outputs to a suitable booster amplifier.

#### Monitor loudspeaker

A built-in monitor loudspeaker with volume control is provided on the front panel. A five-position switch is included to monitor each tuner in turn using the loudspeaker or via a headphone (a socket is provided which automatically disconnects the loudspeaker when the headphone is inserted). The monitor loudspeaker can also be used to provide music for the area where the system is installed, such as in a hotel reception.

#### Mains supply

The tuner unit can be connected to 110, 127, 220-230 or 240 V supplies (at 50 or 60 Hz) as the mains transformer has taps on the primary winding to allow for different line voltages. The transformer is thermally fused to prevent overheating. It is supplied wired for 220 V operation, and changes are made by resoldering

the connections to the appropriate transformer tags. The tuner unit can also be powered from a 24 V DC source. Both the mains and the DC supplies are fused. A 2 m long mains cable terminated at one end with an CEE plug and at the other with an earthed 2-pin mains plug is supplied.

#### Mounting

Suitable for either table-top or 19" rack mounting, the tuner unit is housed in a SQ 20 cabinet that matches all other elements in the range. The cabinet has non-corrosive anti-skid feet fitted. For rack mounting, the cover plate and feet must be removed and the unit is secured using two special mounting flanges (LBB 1239/00 - not supplied).

#### Safety

In common with all Philips products, care is taken to meet high safety standards. The SQ 20 tuner unit complies with the relevant safety and installation regulations of IEC 65 and BS 415.

FIGURE 2.1  
LBB 1229

This socket is also available for connecting other additional auxiliary equipment, such as a graphic equaliser.

.11 microphone channel input connectors including the interconnection socket are 5-pole 180° DIN-type sockets, mounted on the amplifiers rear panel.

Six double cinch type sockets also mounted on the amplifiers rear panel, provide the five, line level inputs, and tape/ cassette recorder output connections.

The outputs of the amplifiers, feeding their respective loudspeakers or groups of loudspeakers (not applicable to pre-mixing amplifier LBB 1230) are provided via an 'in-built' loudspeaker matching transformer.

The transformer provides a choice of three line level output voltages, 70V, 70V, 100V, this means that large groups of loudspeakers, covering long distances may be connected. An advantage of such an in-built facility is that the volume level of each loudspeaker, or groups of loudspeakers may be set individually.

Also included is an 8 Ohm low impedance output, this allows greater flexibility when choosing low ohmic loudspeakers.

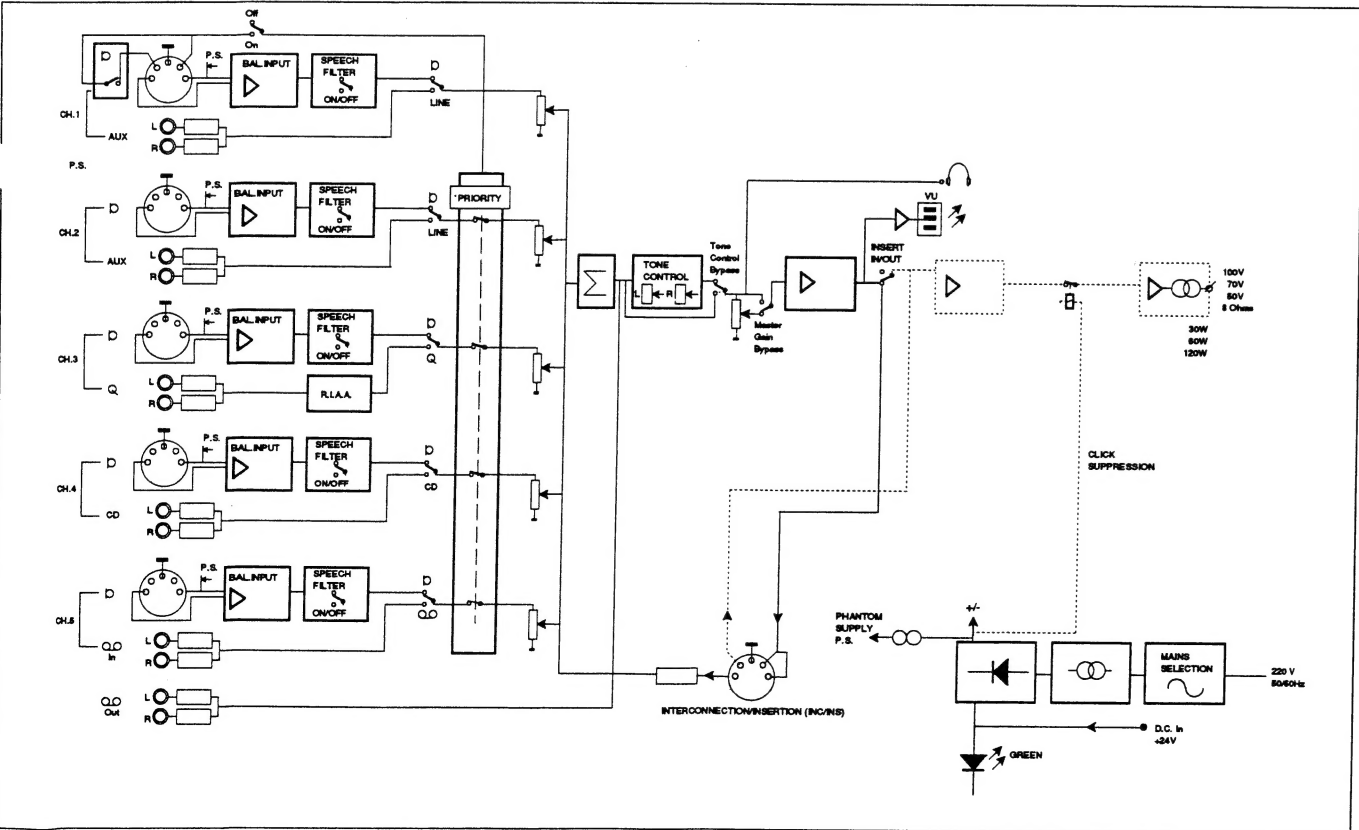
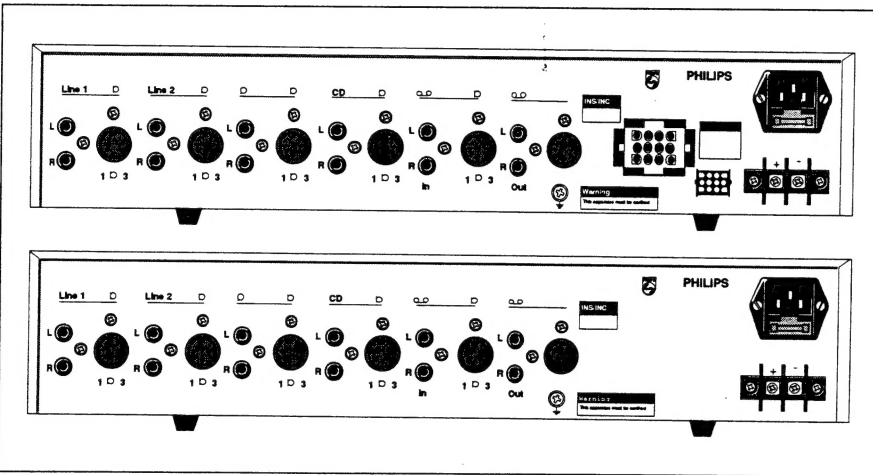
The loudspeaker matching transformer's outputs are fed to their respective loudspeakers via a 'Mate-N-Lok' connector positioned at the rear of the amplifier, thus providing simpli-city in connecting loudspeakers. The front panel of the amplifiers contains easy to use rotary controls for the input sensitivity of each channel, and for both bass and treble tone adjustment of the amplified output signal. A master volume control, controls the overall gain level of the amplifier.

A front panel LED, located in close proximity to the mains switch, illuminates when the amplifier is powered up.

Indications for monitoring the amplifiers output power are provided by front panel mounted LED's.

The mains transformer may be tapped for different a.c mains voltages of 110V, 127V, 220-230V and 240V.

On delivery all amplifiers are supplied with a 2 m long mains lead terminated at one end with a 2-pole mains plug with earth contacts, and at the other end with a C.E.E mains connector.



The **SQ20** range of stand-alone public address **'high performance audio mixing, and pre-mixing amplifiers'** has been designed to fulfil most professional public address requirements.

Due to their architectural design and high degree of versatility, they complement any tailored P.A. system; making them ideal for multi-zone projects requiring amplification for a variety of audio signals, simultaneously.

Ease of installation, together with excellent **'reliability'** and service **'accessibility'**, have been optimized in their design.

The **SQ20** range of mixing and pre-mixing amplifiers is available in a 30 watt, 60 watt, and 120 watt version, each offering its own advantage in fulfilling a variety of application needs.

The comprehensive range of **SQ20** mixing and pre-mixing amplifiers are available with the following type numbers :

- LBB 1230/00 Pre-Mixing
- LBB 1231/00 Mixing (30 watt)
- LBB 1232/00 Mixing (60 watt)
- LBB 1233/00 Mixing (120 watt)

Each amplifier includes **'five input channels'**, each channel can be pre-selected by means of internally mounted switches for use as **'microphone or line inputs'**. When used as microphone inputs, phantom power is available, thus allowing connection of both Philips dynamic and BPE electret microphones. When used as **'line level'** inputs, a variety of sound sources such as a tape or cassette recorder, tuner, compact disc player, or for a magneto-dynamic input such as a record player.

- P.A. amplifiers for table-top and 19" rack mounting.
- Balanced phantom supply audio inputs .
- In-built matching transformer for loudspeakers with 100 V, 70 V, 50 V and 8 Ohm low ohmic tapings.
- Emergency external battery supply facility.
- Built-in monitoring facility with VU meter and headphone.

An additional feature included in the range of mixing and pre-mixing amplifiers is the option of selecting a **'priority microphone channel'**. This feature, which when used with certain Philips microphones including a "priority" switch, allows an announcer to take priority, and mute all other sound sources currently being amplified.

An 'In-built' **'speech-filter'** facility, selectable on all five channels, reduces the bass content of the amplified signal, thus allowing announcements and paging calls to be heard with greater clarity.

An **'Interconnection / Insertion'** socket allows other SQ20 mixing, pre-mixing and booster amplifiers to be connected should requirements change and the system needs to be expanded.

FIGURE 2.2  
LBB 1230 - LBB 1232



TECHNICAL DATA  
*(applicable to all amplifiers unless otherwise stated)*

Mains supply

: 110, 127, 220 V +/- 10%,  
230 V & 240 V +/-10% 50/60 Hz

The amplifier is delivered connected for 220 - 230 Volts A.C.

Battery supply

: + 24 V, ( 0 V grounded)  
deviation -10 to +20%

Power Consumption :

LBB 1230 : 11 VA  
LBB 1231 : 110 VA  
LBB 1232 : 176 VA  
LBB 1233 : 352 VA

Mixer Amplifier  
Pre - amp. section :

Microphone (Channel 1-2-3-4-5) :

- balanced input with phantom supply : 12 V  
- input sensitivity : 1.5mV  
- input impedance : 1360 Ohm  
- max.overload with 2% distortion : 25 dB  
Priority channel 1, over channels 2 to 5

AUX. (Channel 1-2)

- input sensitivity : 120 mV  
- input impedance : 47 kOhm  
- max. overload within 2% distortion : 20 dB

Phono RIAA (Channel 3)

- input sensitivity : 2.5 mV  
- input impedance : 47 kOhm  
- max. overload within 2% distortion : 10 dB

C.D. (Channel 4)

- input sensitivity : 360 mV  
- input impedance : 47 kOhm  
- max. overload within 2% distortion : 15 dB

Tape In (Channel 5)

- input sensitivity : 120 mV  
- input impedance : 47 kOhm  
- max. overload within 2% distortion : 20 dB

Insertion

- input sensitivity : 1 V  
- input impedance : > 20 kOhm

Outputs:

Headphone

- output signal : 3 V  
- output impedance : 68 Ohm

Interconnection/Insert

- output signal : 1 V  
- output impedance : < 200 Ohm  
- output short circuit protected

Tape Out

- output signal : 500 mV  
- output impedance : 3.3 kOhm

Frequency Response

: 60 Hz to 18 kHz  
(+1 to -3 dB)  
- speech filter response : -3 dB at 315 Hz  
(slope 6 dB/octave)

Distortion

- total harmonic distortion at rated  
output voltage : < 0.5% (1 kHz)

Tone Controls

- bass control : +/- 10 dB, at 100 Hz  
- treble control : +/- 10 dB, at 10 kHz

Signal/noise ratio :

measured with microphone input terminated with 200 Ohm  
resistor, phono input with 2 kOhm, AUX, tape and CD input  
with 2 kOhm:  
- master volume control max. and all  
volume control min. : 70 dB  
- microphone control max. : 60 dB  
- phono : 50 dB  
- tape in : 60 dB  
- CD : 60 dB  
(measured between 20 Hz and 20 kHz flat)

Output Power Section

Interconnection/Insert

- input sensitivity : 1 V  
- input impedance: : 20 kOhm

LBB1231 LBB 1232 LBB 1233

- rated output power  
(mains)\* : 30 watt 60 watt 120 watt  
- rated output power  
(battery)\* : 15 watt 30 watt 60 watt  
) acc. IEC 268

Frequency Response:

- measured at 10 dB  
below rated output power : within +1 to -3 dB between  
60 Hz and 18 kHz.

Distortion:

- Total Harmonic Distortion (THD)  
at rated output power -20 dB at 1 kHz : <1%

Loudspeaker Outputs: (not applicable to LBB 1230/00)

| Output Voltage | LBB 1231 | LBB 1232 | LBB 1233 |
|----------------|----------|----------|----------|
| 100 V          | 100 V    | 100 V    | 100 V    |
| 70 V           | 70 V     | 70 V     | 70 V     |
| 50 V           | 50 V     | 50 V     | 50 V     |
| 8 Ohm output   | 15.5 V   | 22 V     | 31 V     |

| Minimum Load | LBB 1231 | LBB 1232 | LBB 1233 |
|--------------|----------|----------|----------|
| 100 V        | 333 Ohms | 167 Ohms | 83 Ohms  |
| 70 V         | 163 Ohms | 82 Ohms  | 41 Ohms  |
| 50 V         | 83 Ohms  | 42 Ohms  | 22 Ohms  |
| 8 Ohm output | 8 Ohms   | 8 Ohms   | 8 Ohms   |

Signal-to-Noise Ratio :

- input connected with 2 kOhm: S/N > 80 dB between 20 Hz  
and 20 kHz flat.

LED VU.

- LED VU On:  
- 20 dB +/- 6 dB green (w.r.t. rated output voltage)  
- 6 dB +/- 3 dB green ( " " " " )  
- 0 dB +/- 2 dB red ( " " " " )

Safety :

: According to IEC 65 and BS 415

Environmental conditions:

- Operation temperature : - 10 to + 45°C  
- Storage temperature : - 40 to + 70°C  
- Relative humidity : 15 to 90%

Dimensions:

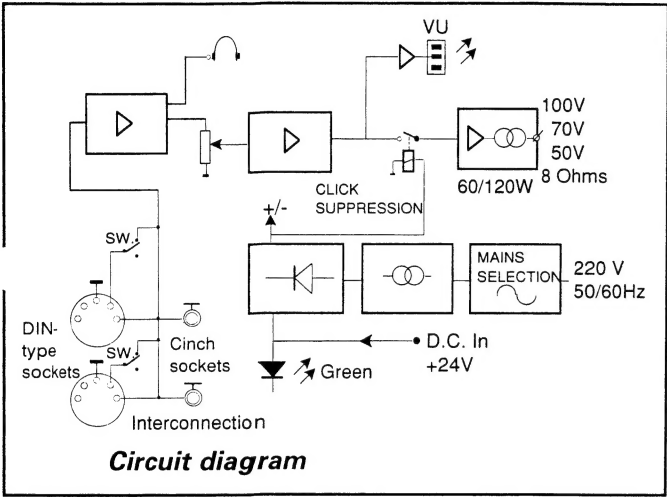
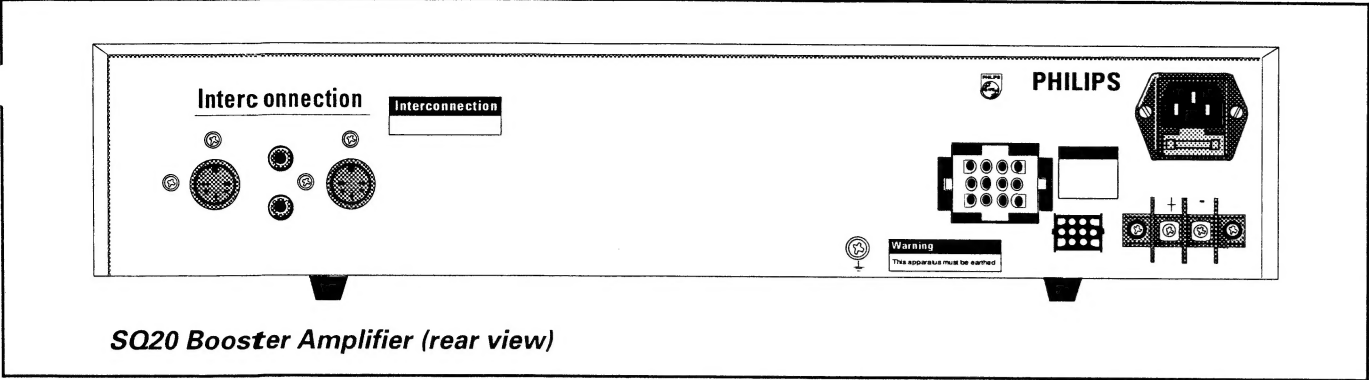
height: 100 mm  
width: 440 mm. Including 19" brackets : 483 mm  
depth: 308 mm. Including handles : 348 mm

Weight :

LBB 1230/00 5.5 kg  
LBB 1231/00 8.1 kg  
LBB 1232/00 9.1 kg  
LBB 1233/00 11.2 kg

This product is manufactured to comply with the radio interference requirements of the Council Directive of 87/308/EEC.

# SQ20 Booster Amplifiers



| Loudspeaker Outputs |             |             |
|---------------------|-------------|-------------|
| Output Voltages     | LBB 1234/00 | LBB 1235/00 |
| 100 V               | 100 V       | 100 V       |
| 70 V                | 70 V        | 70 V        |
| 50 V                | 50 V        | 50 V        |
| 8 Ohm Output        | 22 V        | 31 V        |

| Minimum Load | LBB 1234/00 | LBB 1235/00 |
|--------------|-------------|-------------|
| 100 V        | 167 Ohms    | 83 Ohms     |
| 70 V         | 82 Ohms     | 41 Ohms     |
| 50 V         | 42 Ohms     | 22 Ohms     |
| 8 Ohm Output | 8 Ohms      | 8 Ohms      |

**Signal-to-Noise Ratio**  
- Input connected  
with 2 kOhm : S/N >80 dB between 20 Hz and 20 kHz flat.

**LED VU :**  
LED VU On : - 20 dB +/- 6 dB green  
(w.r.t rated output voltage)  
- 6 dB +/- 3 dB green  
(w.r.t rated output voltage)  
- 0 dB +/- 2 dB red  
(w.r.t rated output voltage)

**Safety :** According to IEC 65 and BS415

**Environmental conditions**  
- Operation temperature : -10 to +45°C  
- Storage temperature : -40 to +70°C  
- Relative humidity : 15 to 90 %

**Dimensions :** height : 100 mm  
width : 440 mm. Including brackets : 483 mm  
depth : 308 mm. Including brackets : 348 mm

| Weight : | LBB 1234/00 | LBB 1235/00 |
|----------|-------------|-------------|
|          | 8.9 kg      | 11 kg       |

This product is manufactured to comply with the radio interference requirements of the council Directive of 87/308/EEC.

## TECHNICAL DATA

**Mains supply:** 110, 127, 220 V +/- 10%,  
230 V & 240 V +/- 10% 50/60 Hz  
The amplifier is delivered connected for 220 - 230 Volts A.C.

**Battery supply:** + 24 V, ( 0 V grounded)  
deviation -10 to +20%

**Power Consumption:** LBB1234/00: 176 VA  
LBB1235/00: 352 VA

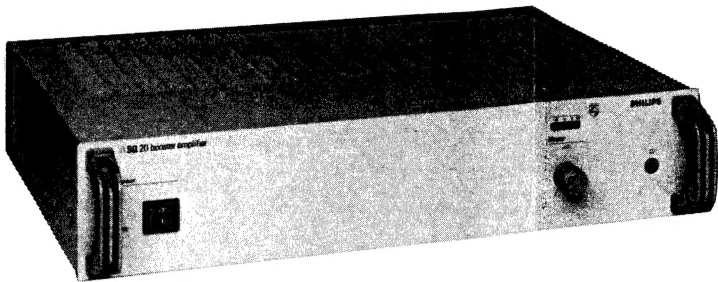
**Interconnection**  
- input sensitivity : 1 V  
- input impedance : 20 kOhm

| Outputs                       | LBB 1234/00 | LBB 1235/00 |
|-------------------------------|-------------|-------------|
| - Rated Output Power (mains)* | 60 watt     | 120 watt    |
| (battery)*                    | 30 watt     | 60 watt     |

\* acc. IEC 268

**Frequency Response**  
- Measured at 10 dB below  
rated output power: within +1 to -3 dB between 60 Hz  
and 18 kHz

**Distortion**  
- Total Harmonic Distortion (THD)  
at rated output power -20 dB at 1 kHz : <1%



The **SQ20** range of stand-alone public address '**high performance booster amplifiers**' has been designed to fulfil most professional public address requirements.

Ease of installation, together with excellent '**reliability**' and service 'accessibility', have been optimized in their design.

The **SQ20** range of booster amplifiers is available in a 60 watt, and a 120 watt version, each offering its own advantage in fulfilling a variety of application needs. Two '**interconnection**' sockets allow other amplifiers in the SQ20 range to be connected. Such amplifiers include the range of high performance mixing and pre-mixing amplifiers or should requirements change and the system needs expanding then additional booster amplifiers could be connected.

The outputs of the amplifiers, feeding their respective loudspeakers or groups of loudspeakers are provided via an in-built loudspeaker matching transformer.

The transformer provides a choice of three line level output voltages, 50 V, 70 V and 100 V, plus an 8 Ohm low ohmic output, this means that a large choice of loudspeakers, may be connected. An advantage of such an in-built facility is that the volume level of each loudspeaker, or group of loudspeakers may be set accordingly.

The loudspeaker matching transformer's outputs are fed to their respective loudspeakers via a 'Mate-N-Lok' connector positioned at the rear of the amplifier, thus providing simplicity in connecting loudspeakers.

- P.A. power amplifiers for table-top and 19" rack mounting.
- Matching transformer for loudspeakers with 100 V, 70 V, 50 V and 8 Ohm low ohmic tapings.
- Emergency external battery supply.
- Monitoring facility with VU meter and headphone.
- Interconnection facility.

A master volume control, controls the overall gain level of the amplifier. A front panel LED, located in close proximity to the mains switch, illuminates when the amplifier is powered up.

Indications for monitoring the amplifiers output power are provided by front panel mounted LED's.

The mains transformer may be tapped for different ac mains voltages of 110 V, 127 V, 220-230 V and 240 V. On delivery all amplifiers are supplied with a 2 m long mains lead terminated at one end with a 2-pole mains plug with earth contacts, and at the other end with a C.E.E mains connector.

Two mounting brackets (LBB 1239/00) and their associated screws may be supplied for 19" rack mounting purposes.

FIGURE 2.3  
LBB 1234 - LBB 1235

### Speech filters

An "in-built" speech filter, available on all microphone channels reduces the bass content of the signal, allowing announcements and messages to be amplified with greater clarity.

### Tape/cassette recorder connection

Facilities at the rear of the amplifier are provided for connecting a tape/cassette recorder for playback and recording purposes. This feature provides a method of distributing the music of your choice, or to broadcast pre-recorded messages such as sale announcements for example.

### In-built FM tuner

An important feature of the system amplifier is its in-built high quality FM tuner, providing a choice of four pre-set channels, each channel being tuned and pre-set by means of miniature tuning controls located at the front of the amplifier.

A standard aerial socket is provided at the rear of the amplifier for connection to the FM tuner. A single cinch type socket provides an output connection from the FM tuner.

### External Music Input

If required an external music source can be connected via the 100 V input of the MATE-N-LOK output connector. This facility is only available on loudspeaker zones 2 and 3.

The versatility of the system amplifier is such that if a call is active in one particular zone, the remaining loudspeaker zones to which the external music source is routed (applicable to zones Z2 and Z3 only) will not be muted in the event of a call.

### Interconnection/Insertion

"Interconnection/insertion"(INS/INC) socket allows other amplifiers in the SQ20 range to be connected should requirements change and the system needs to be expanded.

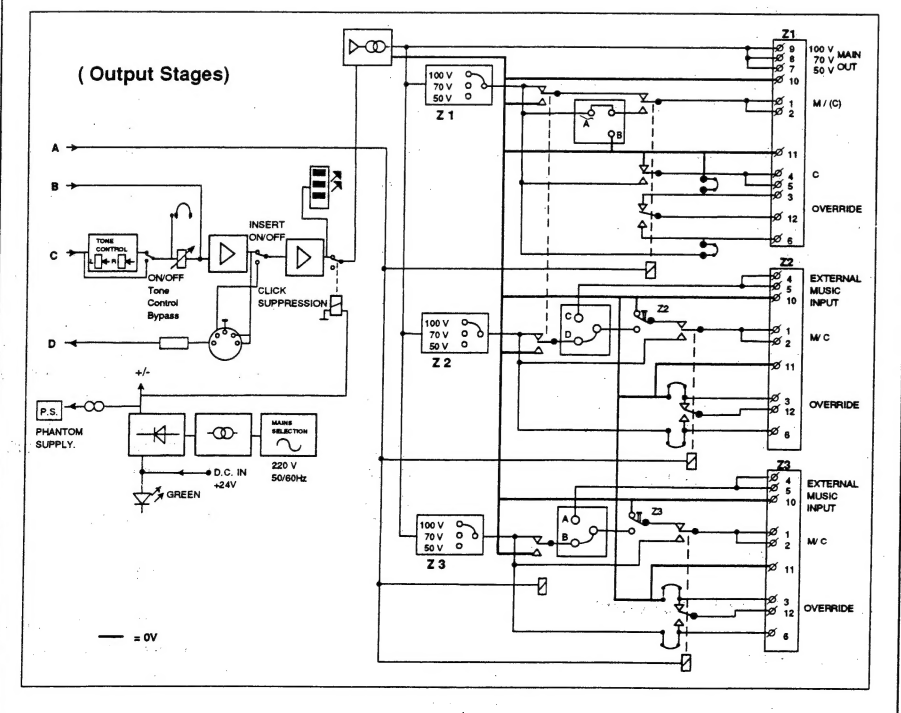
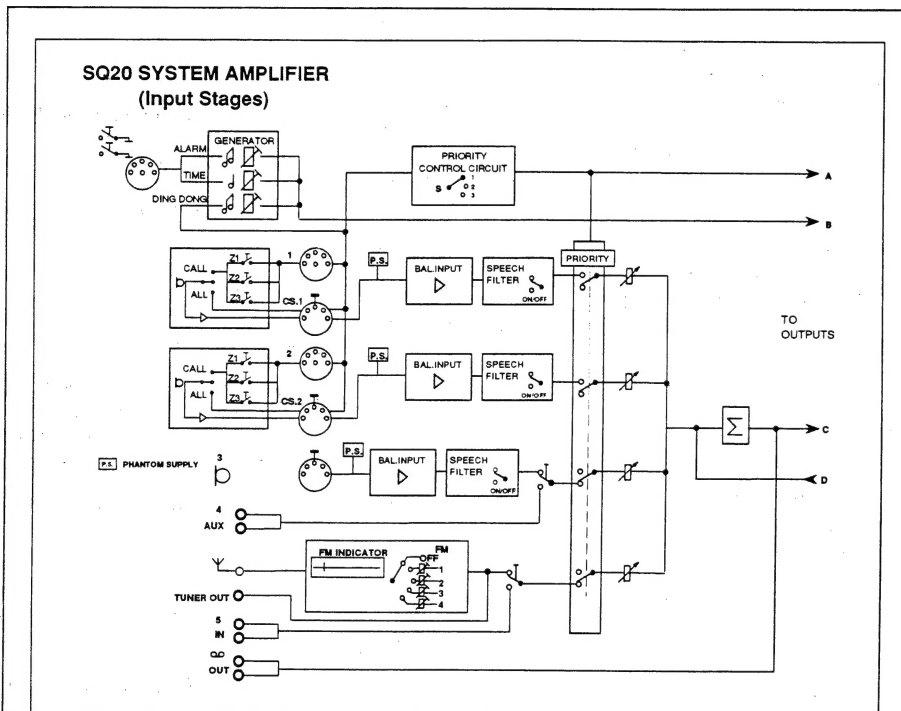
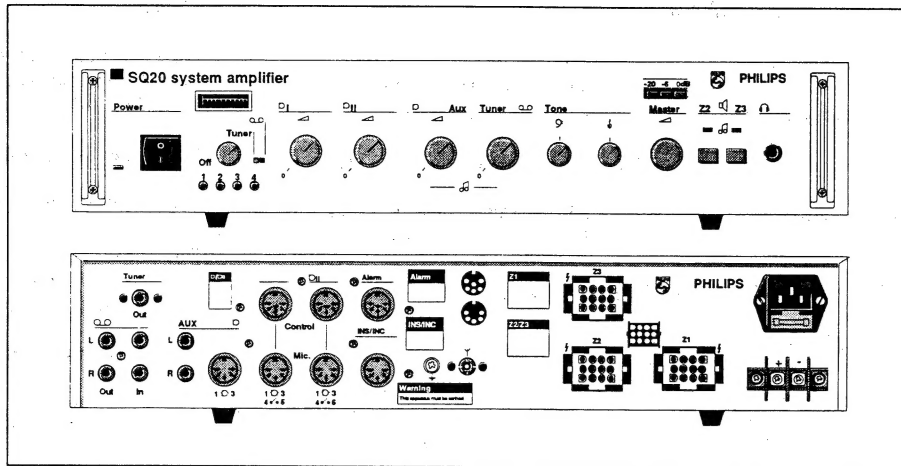
This socket is also available for connecting other additional auxilliary equipment, such as a graphic equaliser...for example.

### Alarm/Time

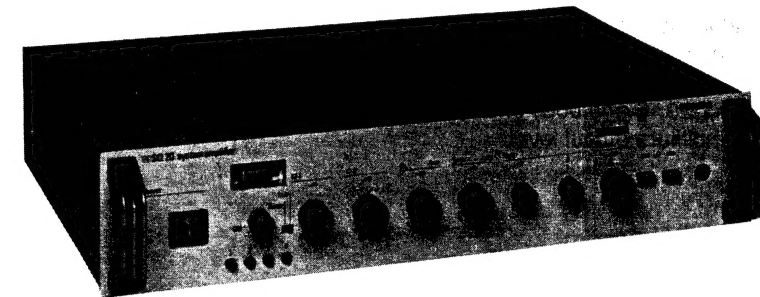
An in-built alarm/time circuit allows for the connection of an external alarm/clock push-button device connected via a 6-pole 240° DIN-type socket.

This feature is particularly useful whenever it is necessary to attract immediate attention, in an emergency for example. Pressing an alarm button will ensure that an alarm tone (twin-tone) notifies the listening public of the situation. Such a device will always take top priority.

A 1-tone time signal (4-seconds), mixed with all other inputs can also be sounded giving warning to the listening public, giving warning when a workshop is about to close for example.



## SQ20 System Amplifiers LBB 1237/00, LBB 1238/00



- High performance, integrated stand-alone public address system.
- Loudspeaker zone routing facilities to three loudspeaker zones, independently, or collectively
- Microphone priority facility providing one of three system operational modes.
- Audible in-built attention tone preceding a Call, plus alarm and time signal tones.
- Loudspeaker override facility for 3 and 4 wire systems.

The SQ20 range of 'high performance system amplifiers' has been designed to provide the user with a versatile, integrated stand-alone public address system. The amplifier includes 'loudspeaker zone routing facilities', and other vital system features each capable of fulfilling the wide variety of public address requirements.

They would typically be used in medium sized factories, garages, offices, supermarkets, shopping areas, schools and sport complexes etc..

Ease of operation combined with good service accessibility and reliability have been optimised in their design.

Due to their architectural design and high degree of versatility, they are ideal for use in multi-zone projects requiring amplification for a variety of audio signals, simultaneously.

The SQ20 range of system amplifiers is available in a 60 watt, and a 120 watt version, each version providing the power handling capacity to meet virtually any system requirement.

The range of SQ20 system amplifiers is available with the following type numbers:

- LBB 1237/00 (60 Watt)
- LBB 1238/00 (120 Watt)

Each amplifier includes 'three microphone input channels', each supplied with phantom power. Two channels are for use with the Philips stand-alone "Call station" microphone, type number LBB 9427/10.

The third microphone input, switchable, is for use with either the wide range of Philips Dynamic or BPE microphones, or be used as an auxilliary line level input for connection to different sound sources, such as a tape/cassette recorder or similar background music source.

The user-friendly "Call station" microphone, LBB 9427/10 provides push-button facilities for 'routing announcements and messages' to selected loudspeaker zones, either individually or to all three loudspeaker zones collectively.

This feature is particularly useful where a message must reach the staff only, and not the general public, as in a supermarket.. for example

### Attention Tone

Preceding any call or announcement an audible attention tone will alert the listening public.

### Microphone Priority

An in-built "microphone priority" facility provides the user with the option of assigning one of three system operational modes.

#### 1. First-In First-Served

The first call station user gains access to the system.

#### 2. Serial Priority.

Call station microphone No.1 is given priority over call station microphone No.2.

#### 3. Single Call Station

Call station No.1 has priority over all other connected inputs, while call station No.2 is mixed with other connected inputs. Call station No.2 can be replaced with a normal BPE or Dynamic microphone.

FIGURE 2.4  
LBB 1237 - LBB 1238



Loudspeaker Outputs

The loudspeaker outputs of the amplifier are provided via an output transformer, allowing connection to a wide range of loudspeakers. The outputs are connected via three Mate-N-Lok connectors, one per loudspeaker zone, each mounted on the amplifiers rear panel.

The outputs can be tapped per zone independently, at three different voltages, namely 50V, 70V and 100V, meaning that large groups of loudspeakers covering long distances can be connected.

Override Facility

An in-built override relay can be used to provide loudspeaker override facilities, using 3 and 4 wire systems. This means that all loudspeakers in the system, which include a volume control, can be activated (even if they are not turned on) so that emergency messages or announcements are broadcast at full power. An additional feature of the override relay, is to trigger external functions, (...by Call signals to illuminate warning lamps in designated areas for example).

System Amplifier Controls

The front panel contains rotary controls for the input sensitivity of both call station input channels, the auxilliary/microphone channel, and the tuner/tape recorder channel. Similar controls adjust the bass and treble tone adjustment of the overall amplified signal.

A master volume control, controls the overall gain level of the amplifier. A front panel LED, located in close proximity to the mains switch, illuminates when the amplifier is powered up.

Two manual front panel zone selection buttons which if pressed directly route the chosen music source, to the selected loudspeaker zone. Indicators, indicate the chosen zone or zones selected.

Headphones can be connected via a 6.3mm headphone socket for easy system monitoring, while three front panel LED's (-20,-6 and 0dB) give at a glance the amplifiers output level.

Power supply

The SQ20 system amplifier, as well as being powered from the a.c mains can also be powered from an emergency battery supply of 24 volts d.c. The mains transformer can be tapped for different a.c mains voltages of 110V, 127V 220-230V and 240V.

On delivery, all amplifiers are supplied with a 2m long mains lead terminated at one end with a 2-pole mains plug with earth contacts, and at the other end with a C.E.E. mains connector.

TECHNICAL DATA

Mains supply : 110, 127, 220V +/- 10%, 230V & 240V +/-10% 50/60 Hz  
The amplifier is delivered connected for 220 - 230 Volts A.C.

Battery supply : + 24 V, ( 0 V grounded) deviation -10 to +20%

Power consumption : LBB 1237/00 187 VA LBB 1238/00 374 VA

Mixer Amplifier ( Pre -amp. section )

Inputs

Microphone (Channel 1 -2 - 3 ) :

- balanced input with phantom supply : 12V  
- input sensitivity : 1.5mV  
- input impedance : 1360 Ohm  
- max. overload with 2% distortion : 25 dB  
Priority channel 1&2 over channels 3 & 4.

AUX. (Channel 3)

- input sensitivity : 120 mV  
- input impedance : 47 kOhm  
- max. overload within 2% distortion : 20 dB

Tape In. (Channel 4)

- input sensitivity : 120 mV  
- input impedance : 47 kOhm  
- max. overload within 2% distortion : 20 dB  
FM Tuner Insertion : In-built FM tuner

FM Tuner Insertion

- input sensitivity : 1V  
- input impedance : >20 kOhm

Chime, Alarm and Tone signals

- Chime (2-tone) via Call station : (1) 440 Hz ( 1 sec.)  
(2) 555 Hz (0.5 sec.)  
- time signal : 555 Hz (4 sec. const.)  
- alarm signal : 440 Hz & 555 Hz (0.25 sec. constant)

Outputs

Headphone

- output signal : 3V  
- output impedance : 68 Ohm

Interconnection/Insert

- output signal : 1V  
- output impedance : <200 Ohm

Interconnection/Insert

Interconnection/Insert

Interconnection/Insert

Interconnection/Insert

Interconnection/Insert

Interconnection/Insert

Interconnection/Insert

Interconnection/Insert

Interconnection/Insert

Interconnection/Insert

Interconnection/Insert

Interconnection/Insert

Interconnection/Insert

Interconnection/Insert

Interconnection/Insert

Interconnection/Insert

Interconnection/Insert

Interconnection/Insert

Interconnection/Insert

Interconnection/Insert

Interconnection/Insert

Interconnection/Insert

Interconnection/Insert

Interconnection/Insert

Interconnection/Insert

Interconnection/Insert

Interconnection/Insert

Interconnection/Insert

Interconnection/Insert

Interconnection/Insert

Interconnection/Insert

Interconnection/Insert

Interconnection/Insert

Interconnection/Insert

Interconnection/Insert

Interconnection/Insert

Interconnection/Insert

Interconnection/Insert

Outputs

LBB1237 LBB 1238  
- rated output power (mains) \* : 60 Watt 120 Watt  
- rated output power (battery)\* : 30 Watt 60 Watt  
\* acc. IEC 268

Frequency Response:

- measured at 10 dB  
below rated output power : within +1 to -3dB between 60 Hz and 18 kHz.

Distortion:

- total harmonic distortion  
at rated output voltage : < 1%(1kHz)

| Loudspeaker Outputs:            |          |          |
|---------------------------------|----------|----------|
| Output Voltage<br>100, 70V, 50V | LBB 1237 | LBB 1238 |
| Minimum Load                    |          |          |
| 100 V                           | 167 Ohms | 83 Ohms  |
| 70 V                            | 82 Ohms  | 41 Ohms  |
| 50 V                            | 42 Ohms  | 22 Ohms  |

Signal-to-Noise Ratio

- input connected  
with 2 kOhm: S/N >80 dB between 20 Hz and 20 kHz flat.

LED VU. LED VU On: - 20 dB +/- 6 dB green  
- 6 dB +/- 3 dB green  
0 dB +/- 2 dB red  
The above are w.r.t. rated output voltage.

Safety : According to IEC 65 and BS 415

Environmental Conditions:

- Operation temperature : - 10 to + 45° C  
- Storage temperature : - 40 to + 70°C  
- Relative humidity : 15 to 90%

Dimensions: : H x W x D: 100 x 440 x 308  
width including 19" brackets: 483 mm  
depth including handles: 348 mm

Weight : LBB 1237/00 9.8 kg LBB 1238/00 11.9 kg

Call Station Microphone LBB 9427/10

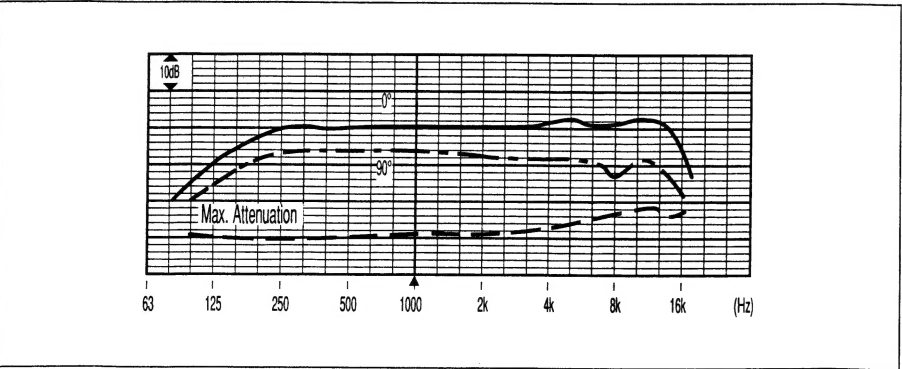
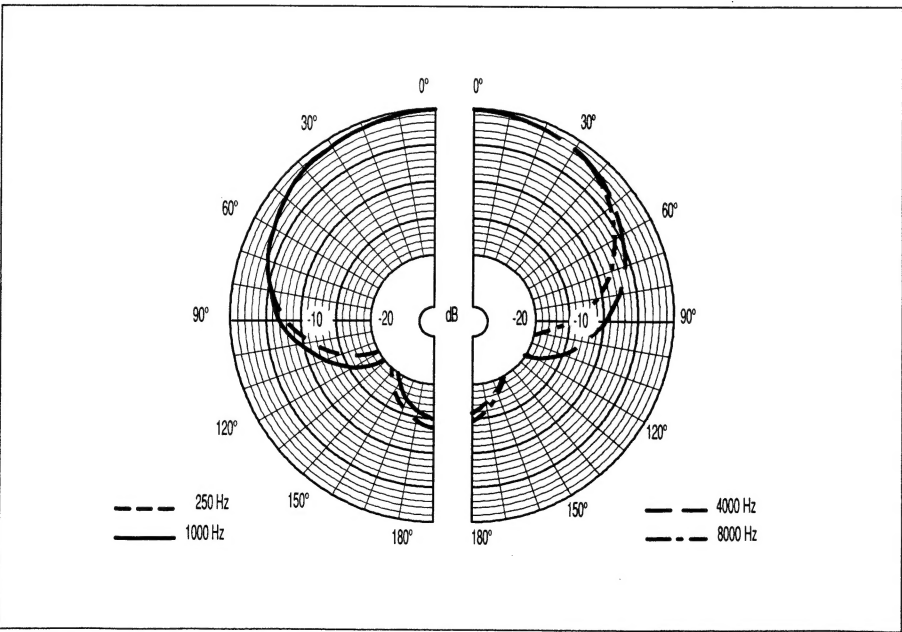
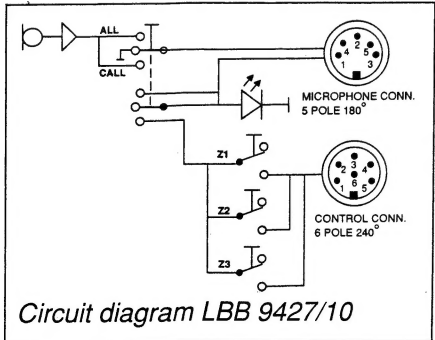
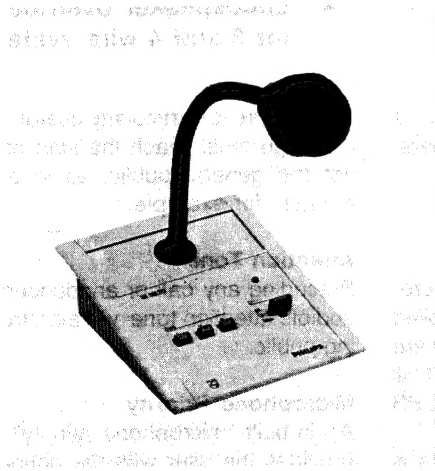
Description : table-stand microphone with 3-position switch  
Off, "ALL Call" and "Call", plus LED indication  
On and busy. Three push-buttons for selection of  
3 loudspeaker zones, individually or collectively.

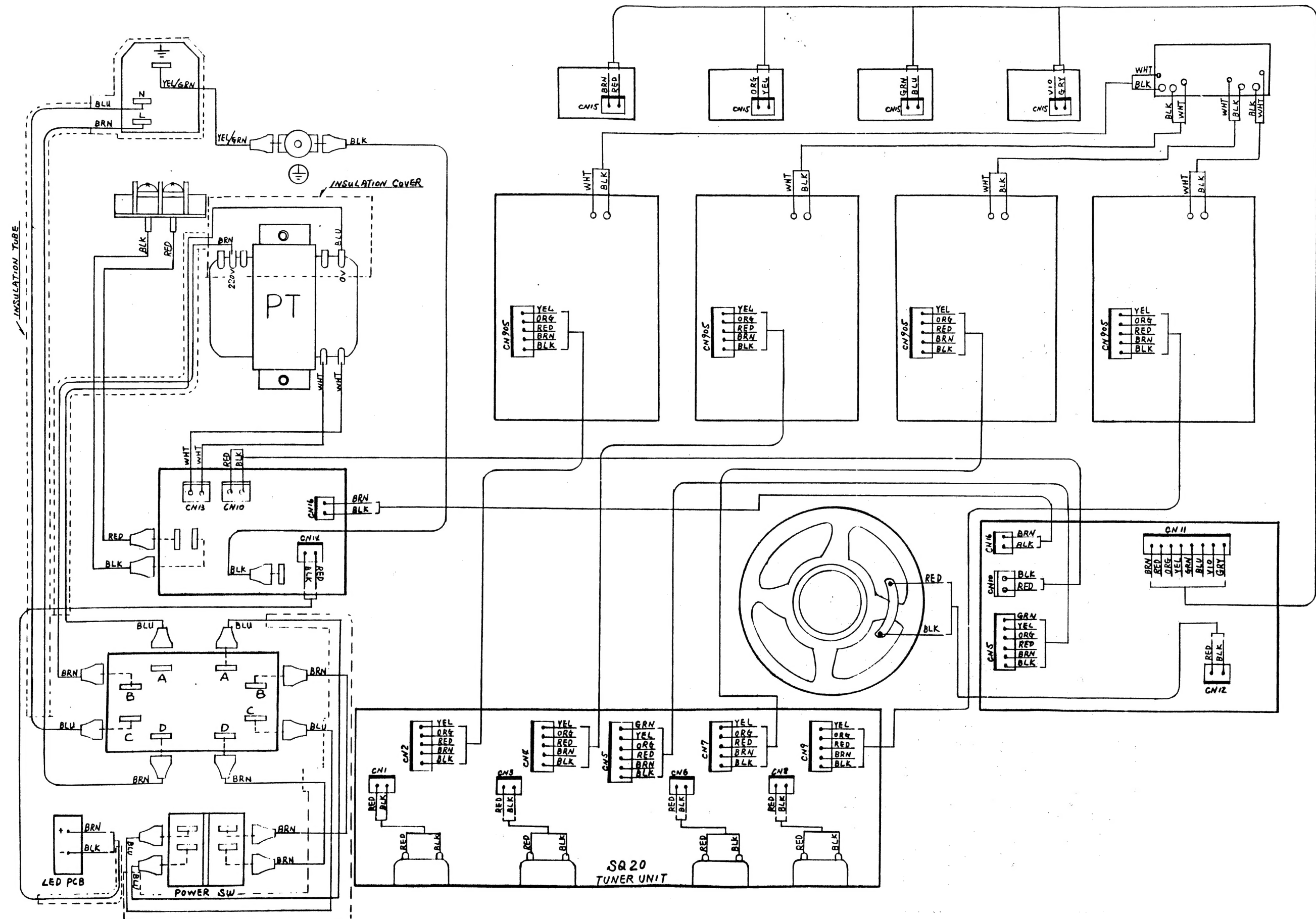
- transducer : BPE condenser  
- polar pattern : Hypercardioid  
- freq.range (acc. to IEC 268-4) : 180 - 12,000 Hz at -3dB  
145 - 13,000 Hz at -6dB  
- sensitivity (acc. to IEC 268-4) : 2.8 mV/Pa +/- 3 dB  
(-51 dB re. to 1 V/Pa)

Max. SPL for THD <3% : 134 dB  
Rated output impedance : <200 Ohm  
- Load impedance : > 600 Ohm  
- Equivalent input noise level : 19 dB(A)  
- Phantom power supply : 11 - 52 V  
(acc. to DIN 45596 and IEC 268 - 15A)  
- Current consumption : < 5 mA  
- Ambient temperature range : -10°C to +55°C  
- Ambient rel. humidity : 80% max. at 20°C  
- Cable : 2-core + 2-core screened,  
3m & 5 core, 3m  
- Connector : 5-pole 180° DIN-plug  
6-pole 240° DIN-plug  
- weight : 0.87 kg (incl. cable)

These product are manufactured to comply with the radio  
interference requirements of the Council Directive of 87/308/  
EEC.

Call Station Microphone LBB 9427/10







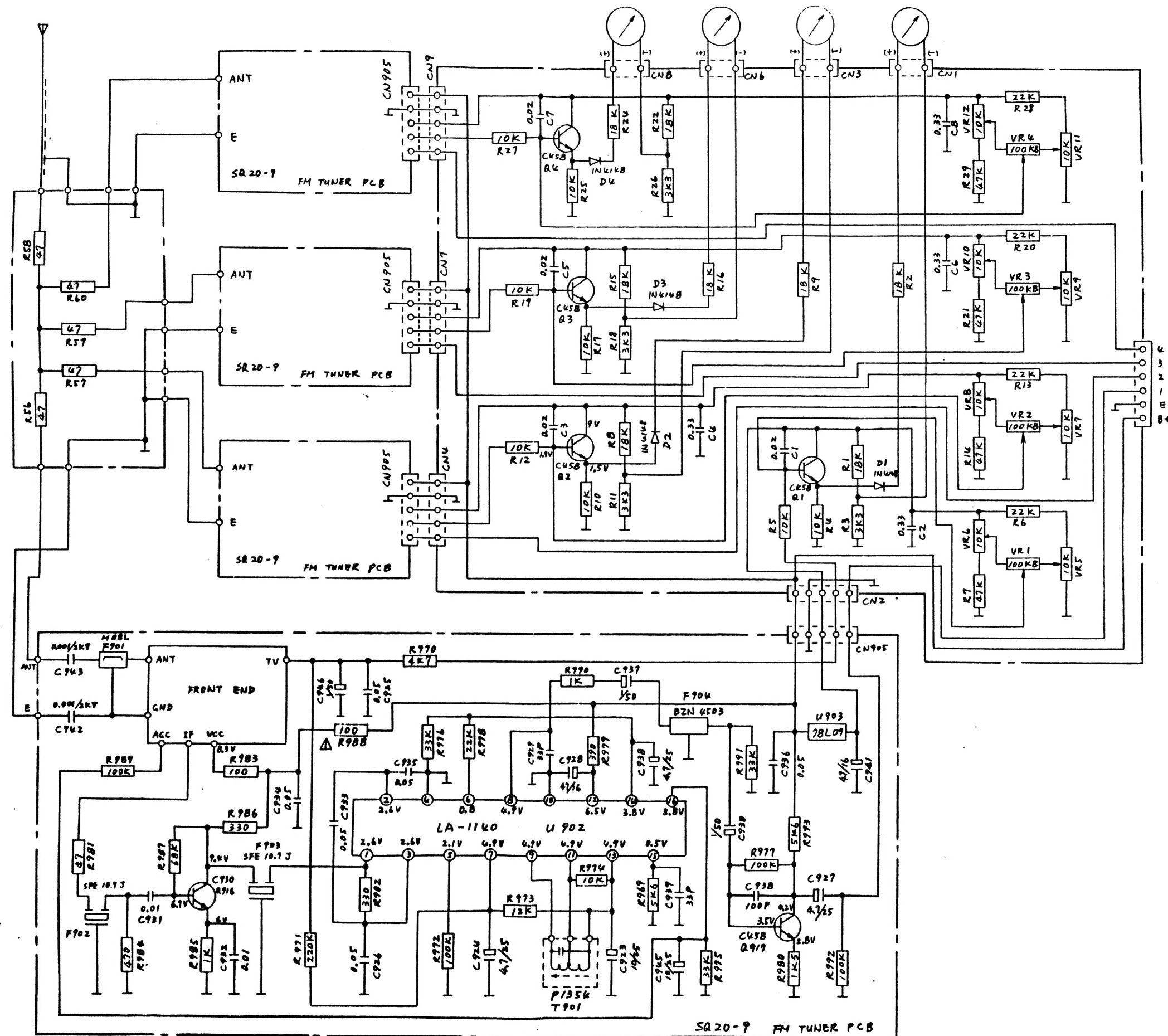
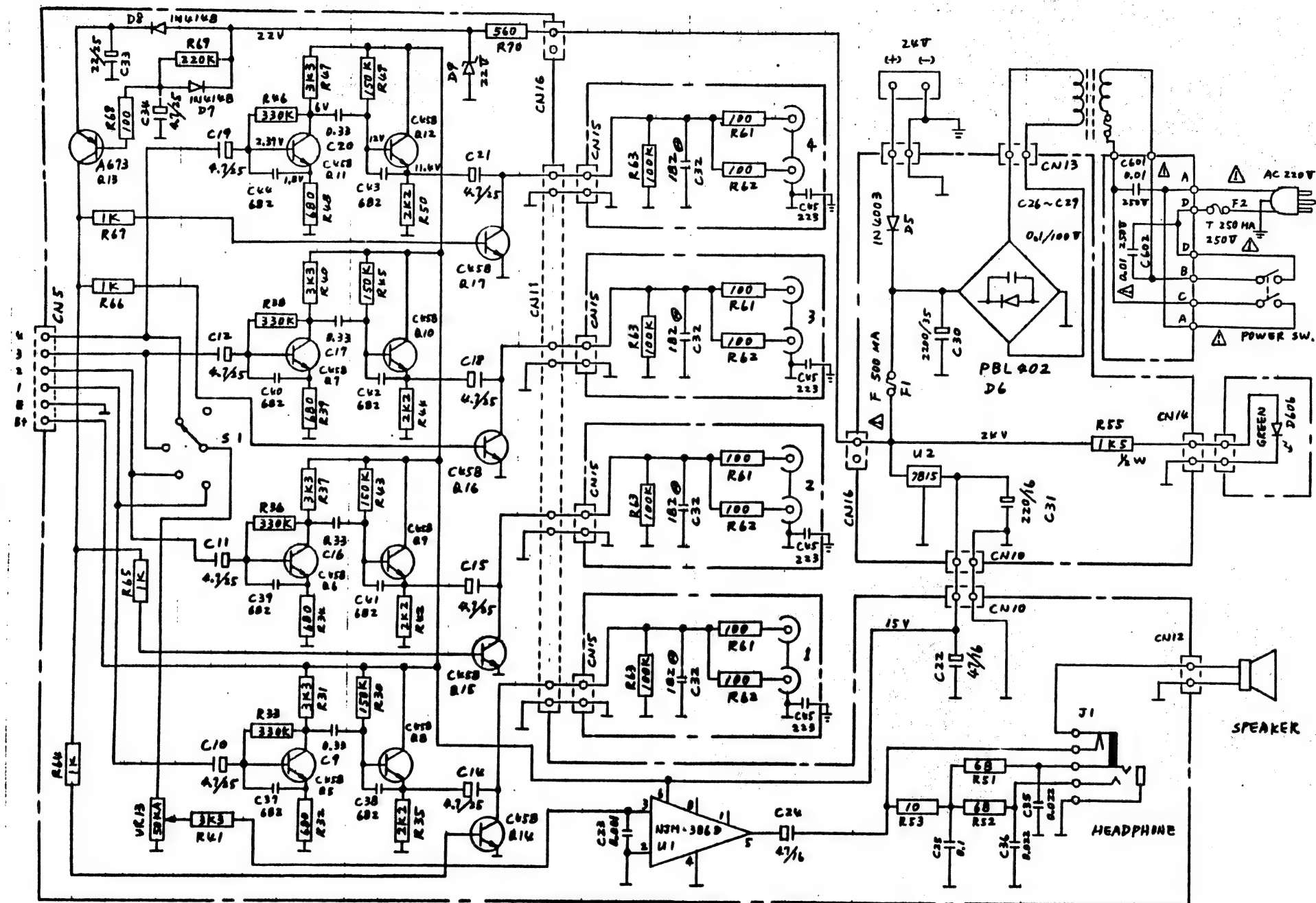
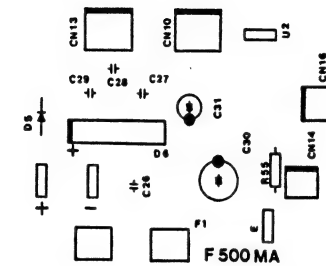
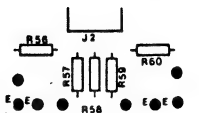
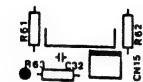
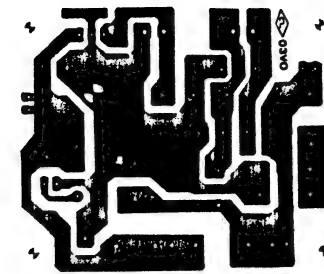
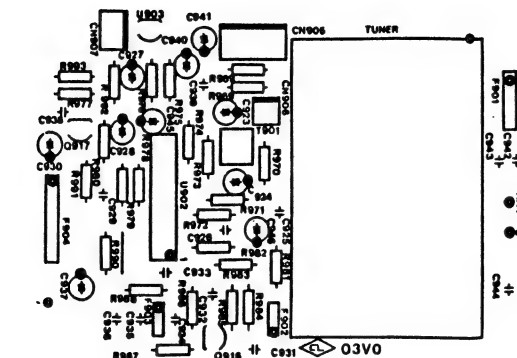
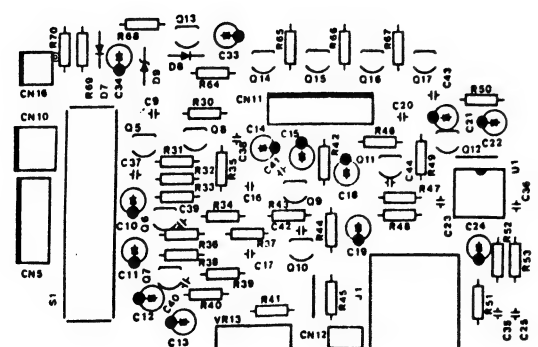
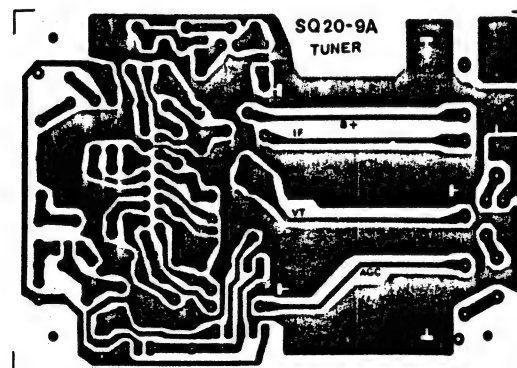
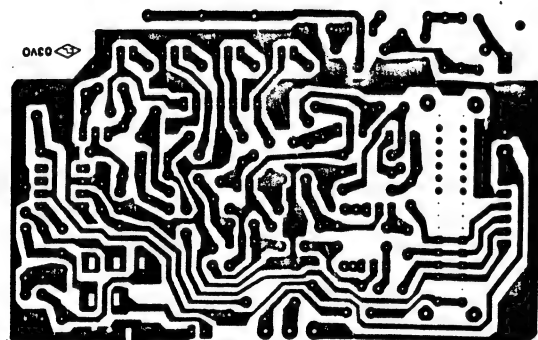
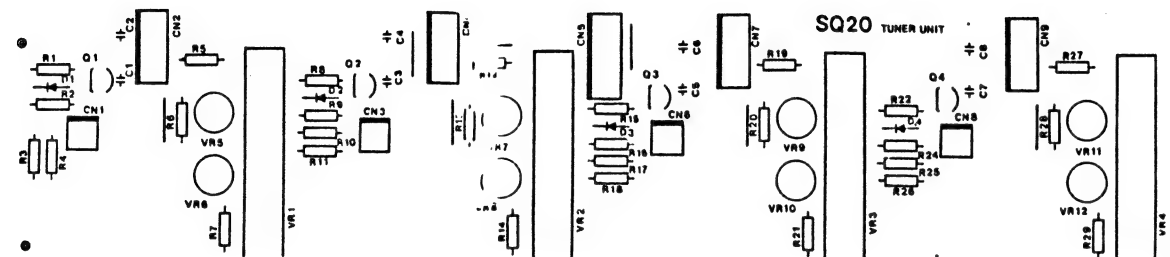
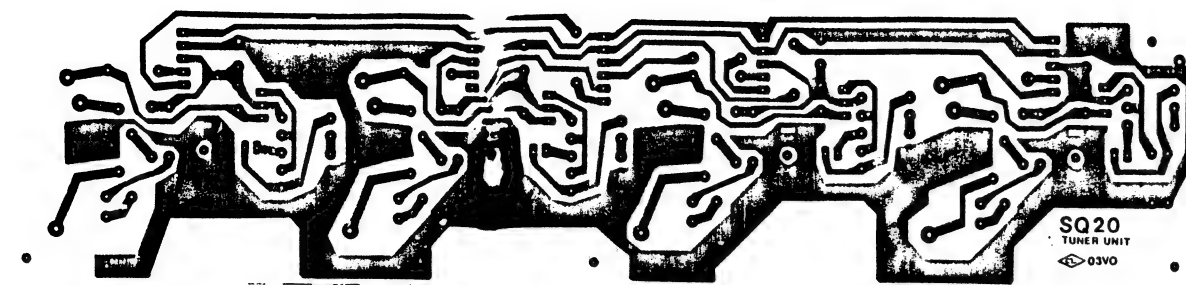
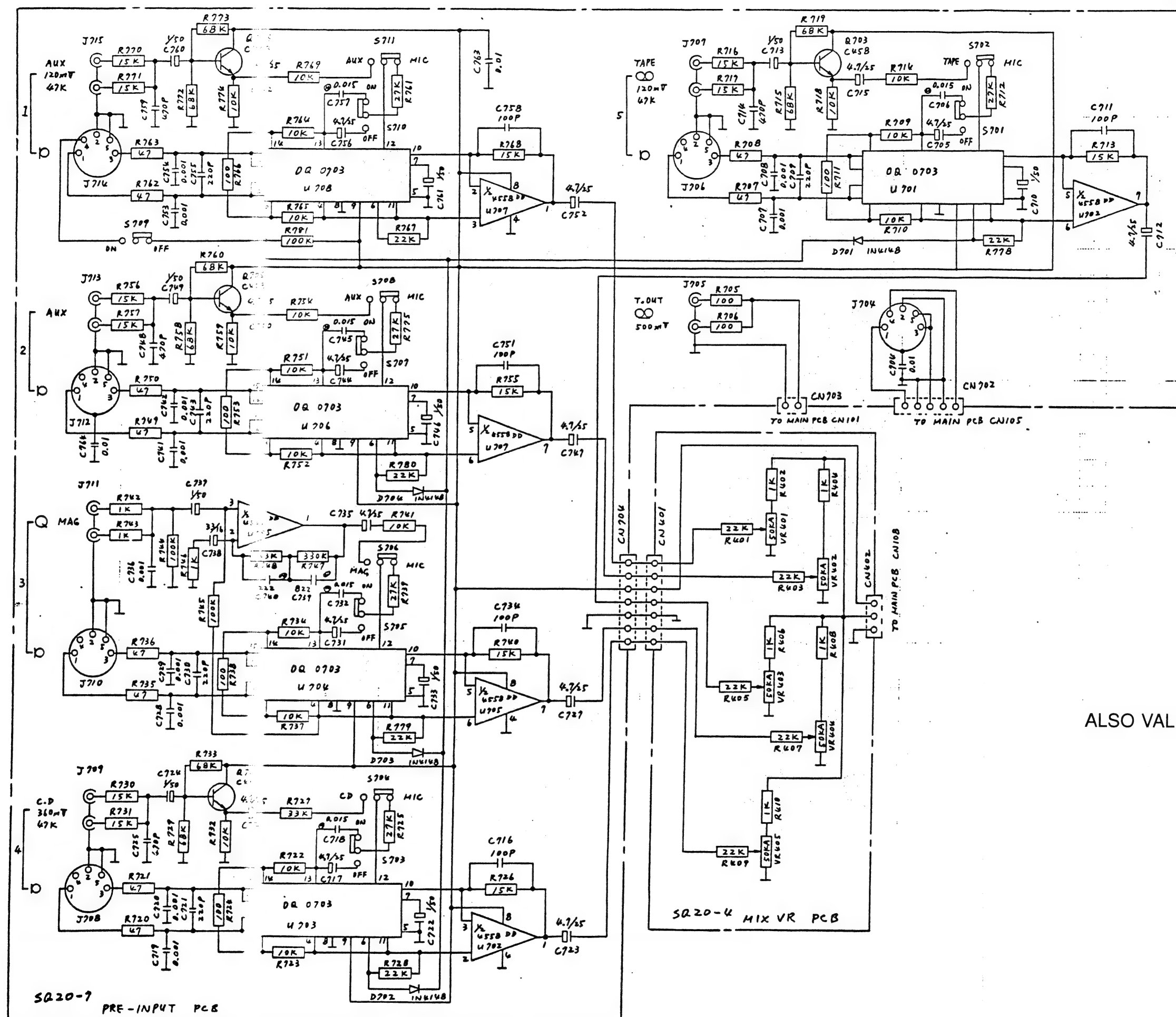


FIGURE 7.2  
LBB 1229  
CIRCUIT DIAGRAM PART 1





**FIGURE 7.4**  
**LBB 1229**  
**PCB LAY-OUT**



ALSO VALID FOR: LBB 1 231  
LBB 1 232  
LBB 1 233

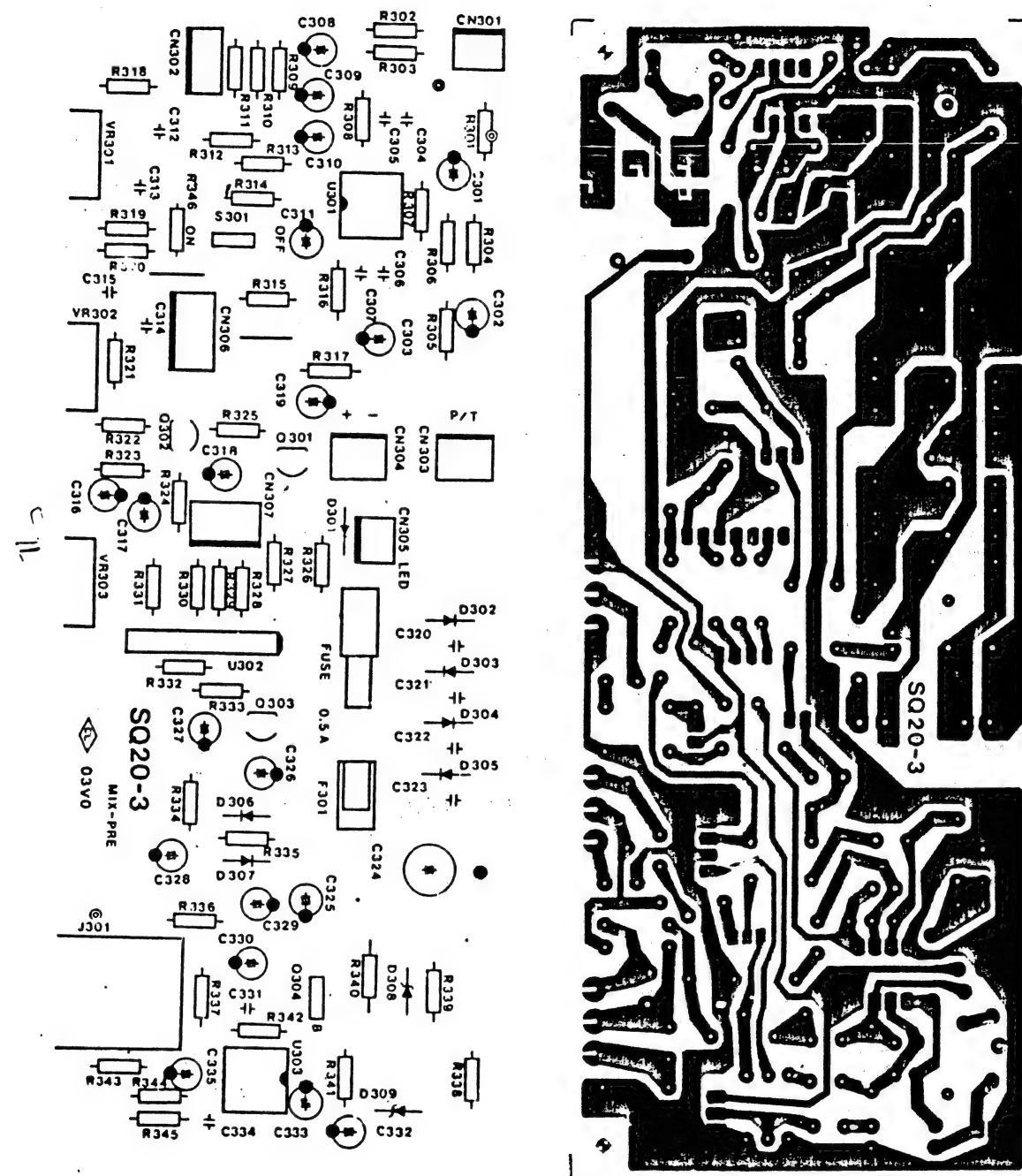
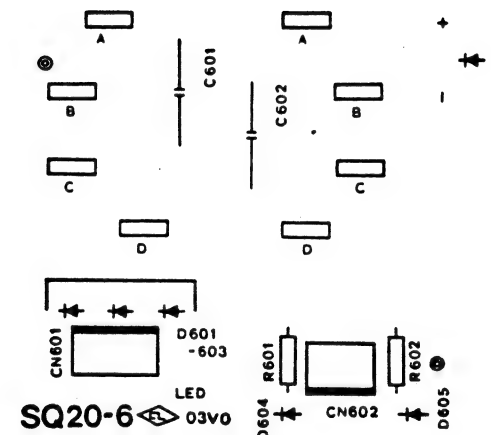
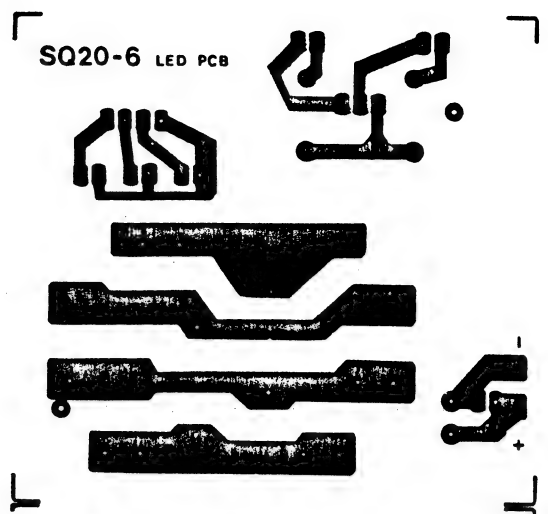
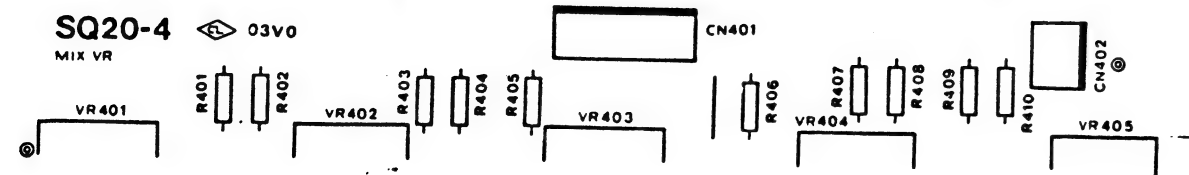
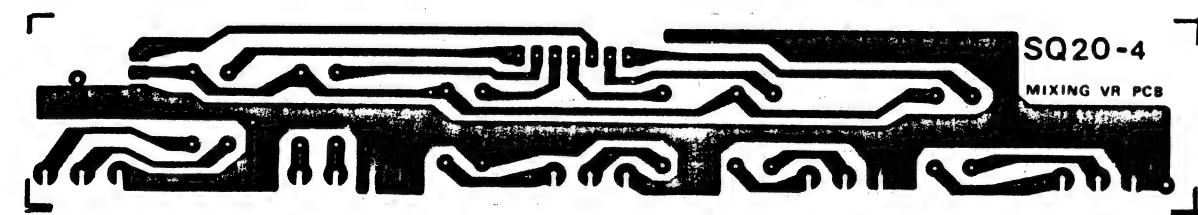
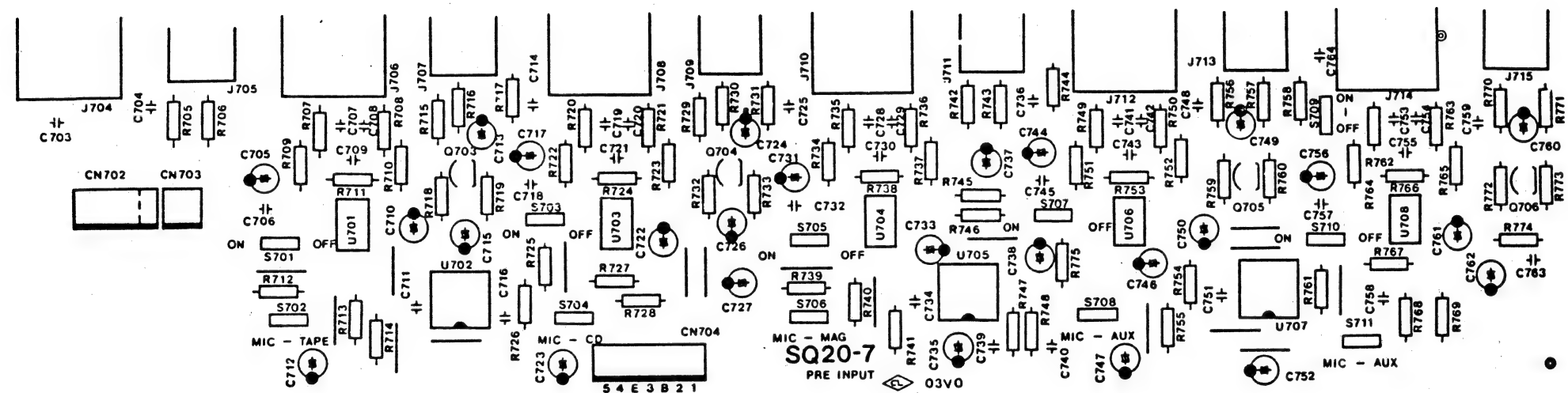
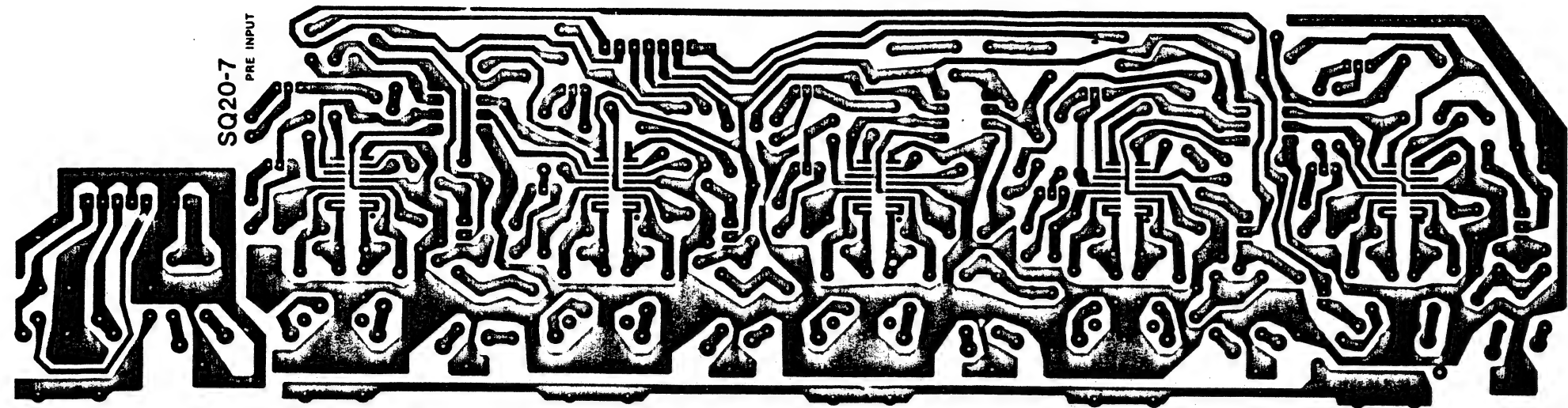
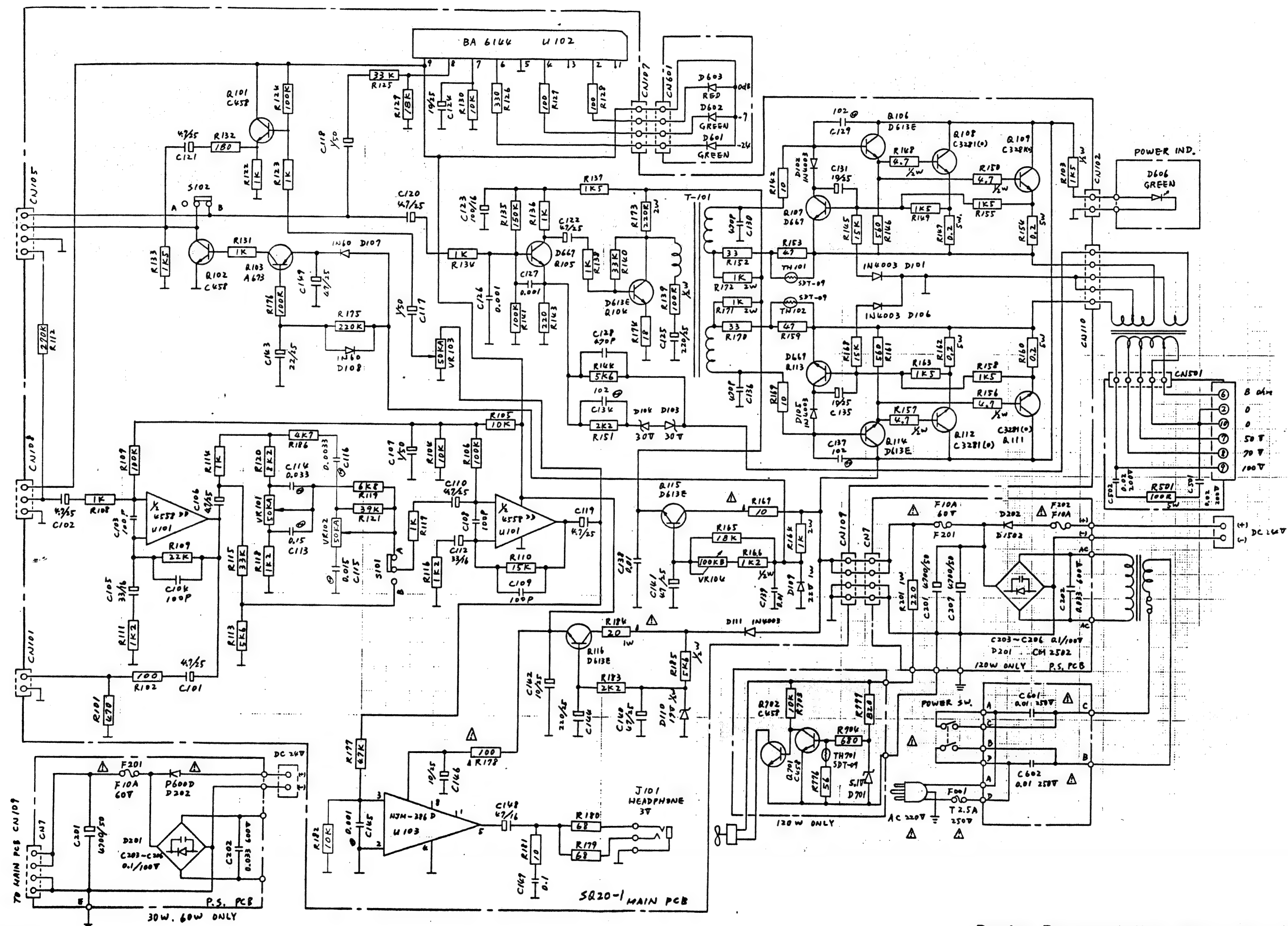


FIGURE 7.6  
LBB 1230  
PCB LAY-OUT







**FIGURE 7.8**  
**LBB 1231/1232/1233**  
**CIRCUIT DIAGRAM PART 1**

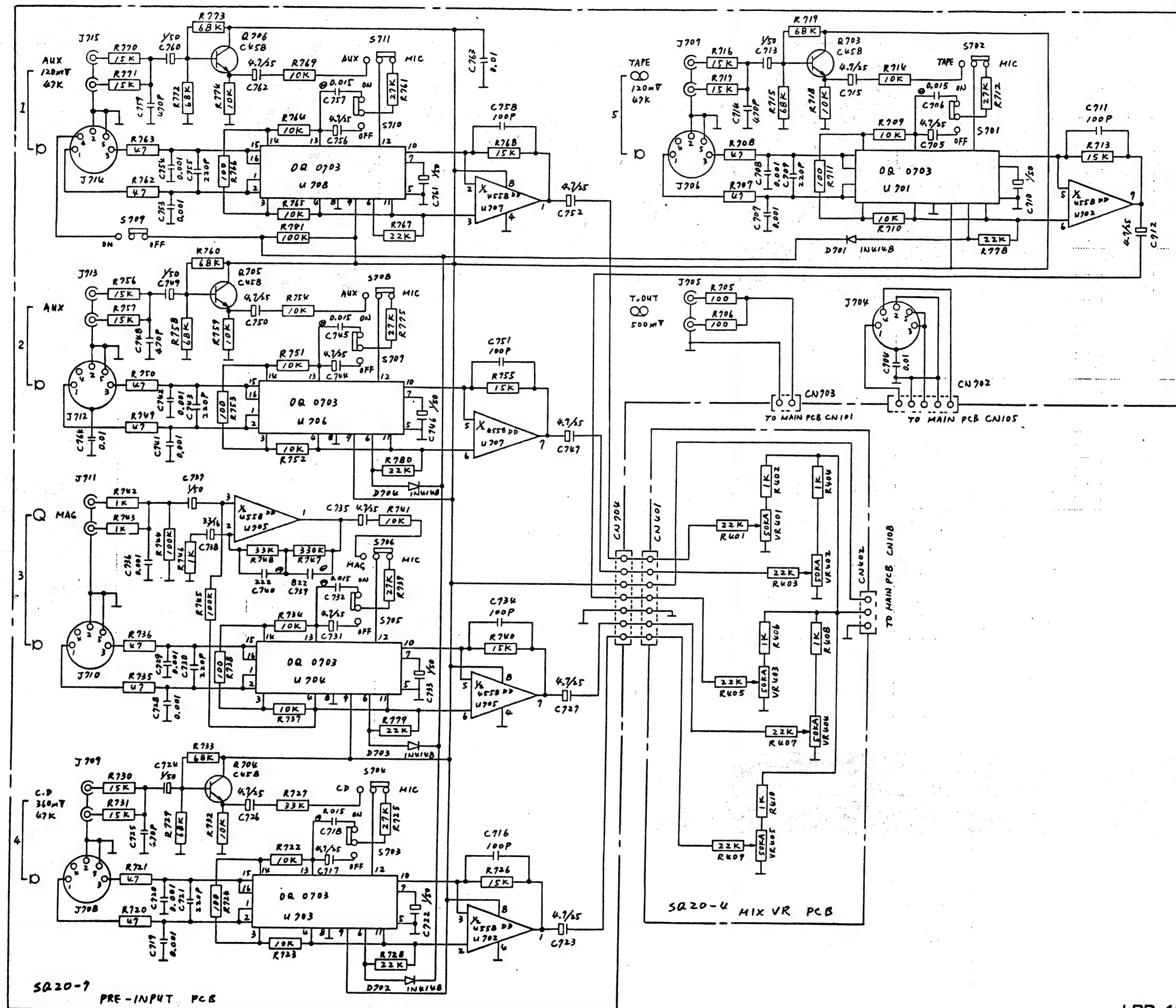


FIGURE 7.9  
LBB 1231/1232/1233  
CIRCUIT DIAGRAM PART 2

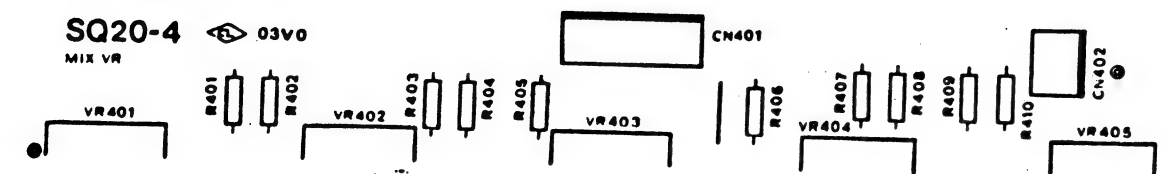
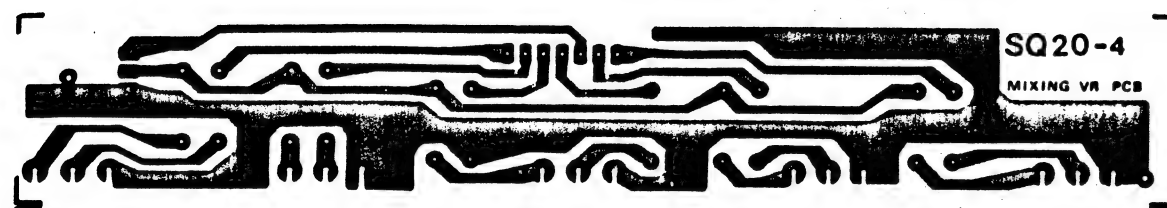
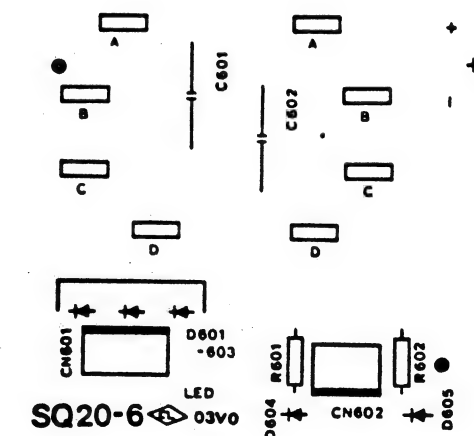
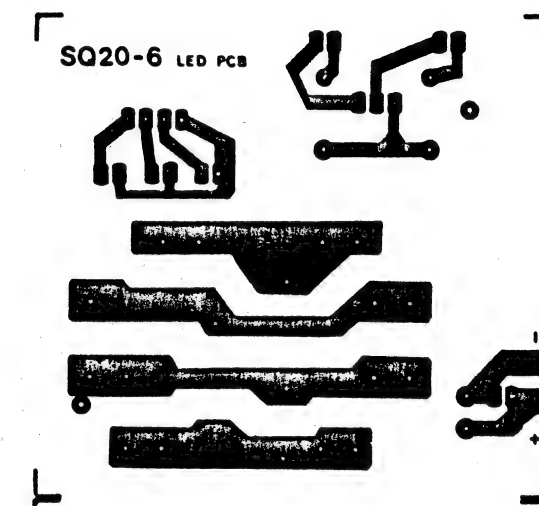
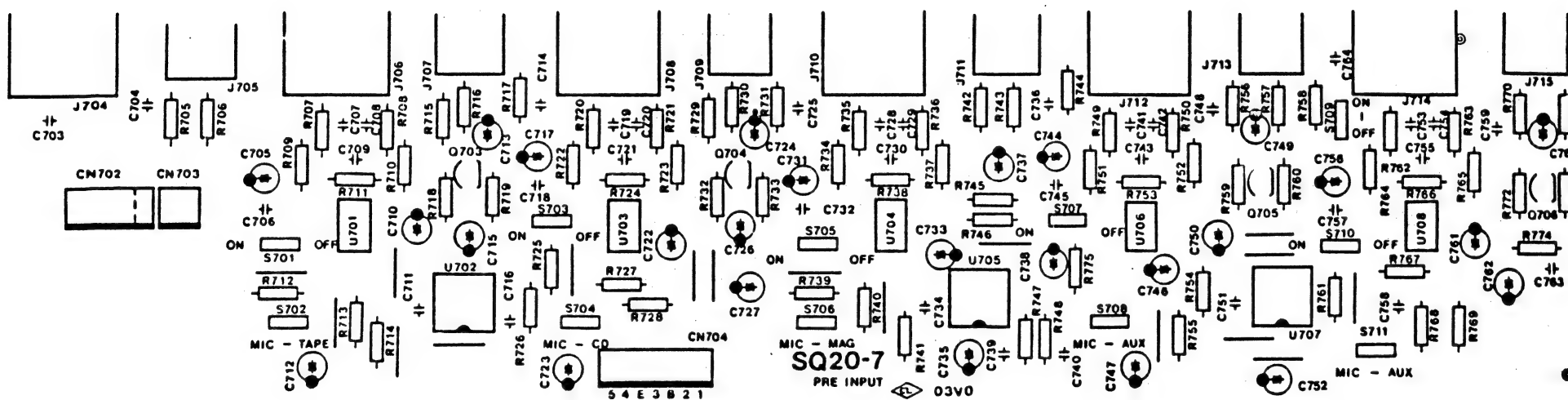
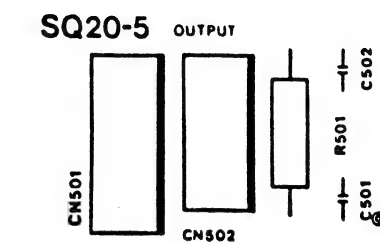
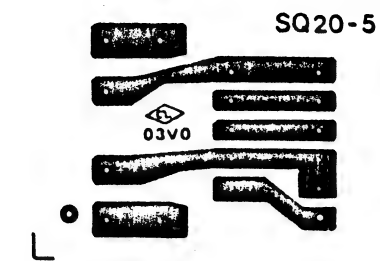
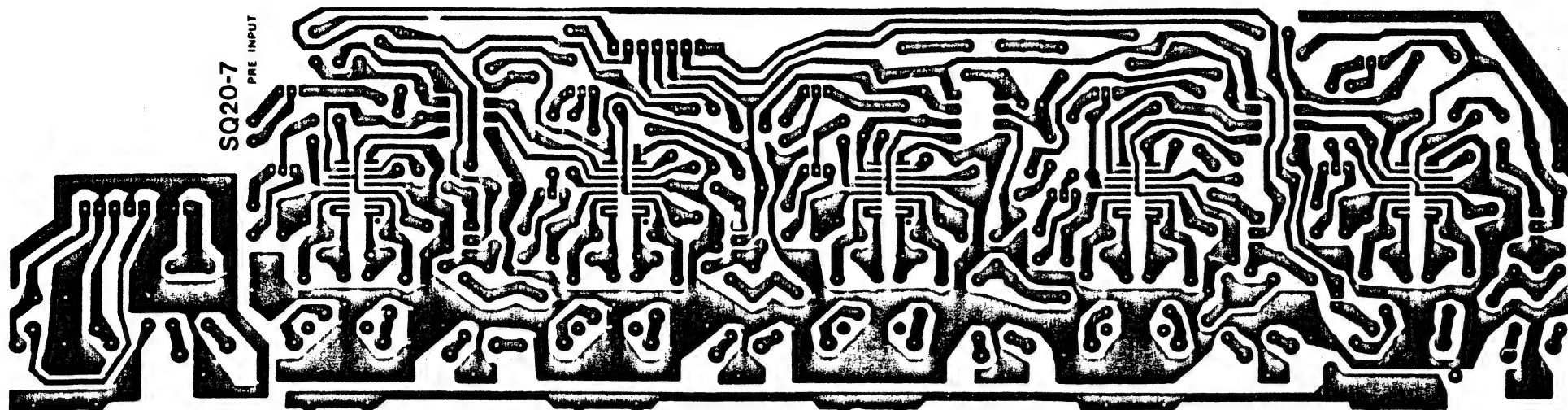
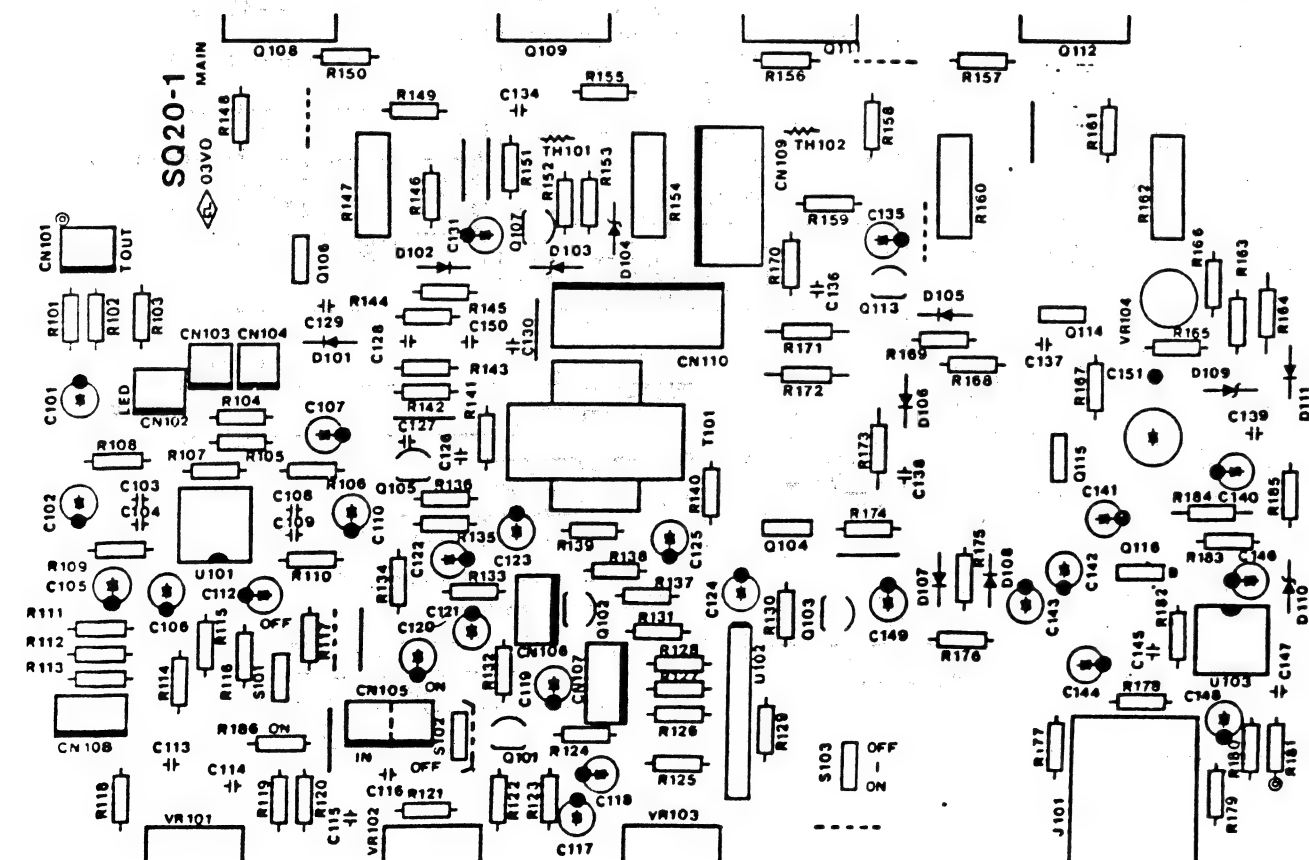
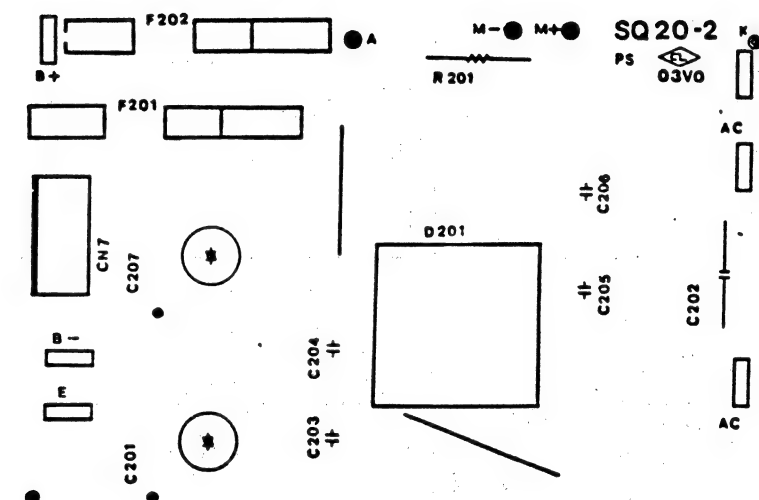
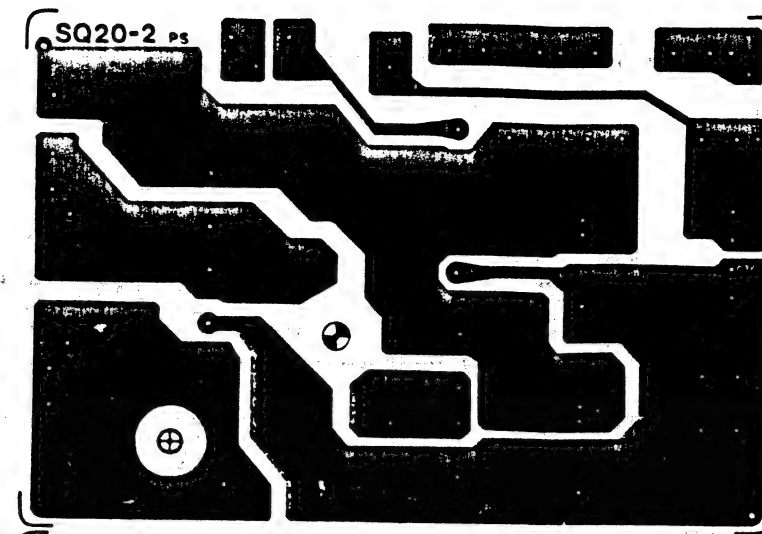
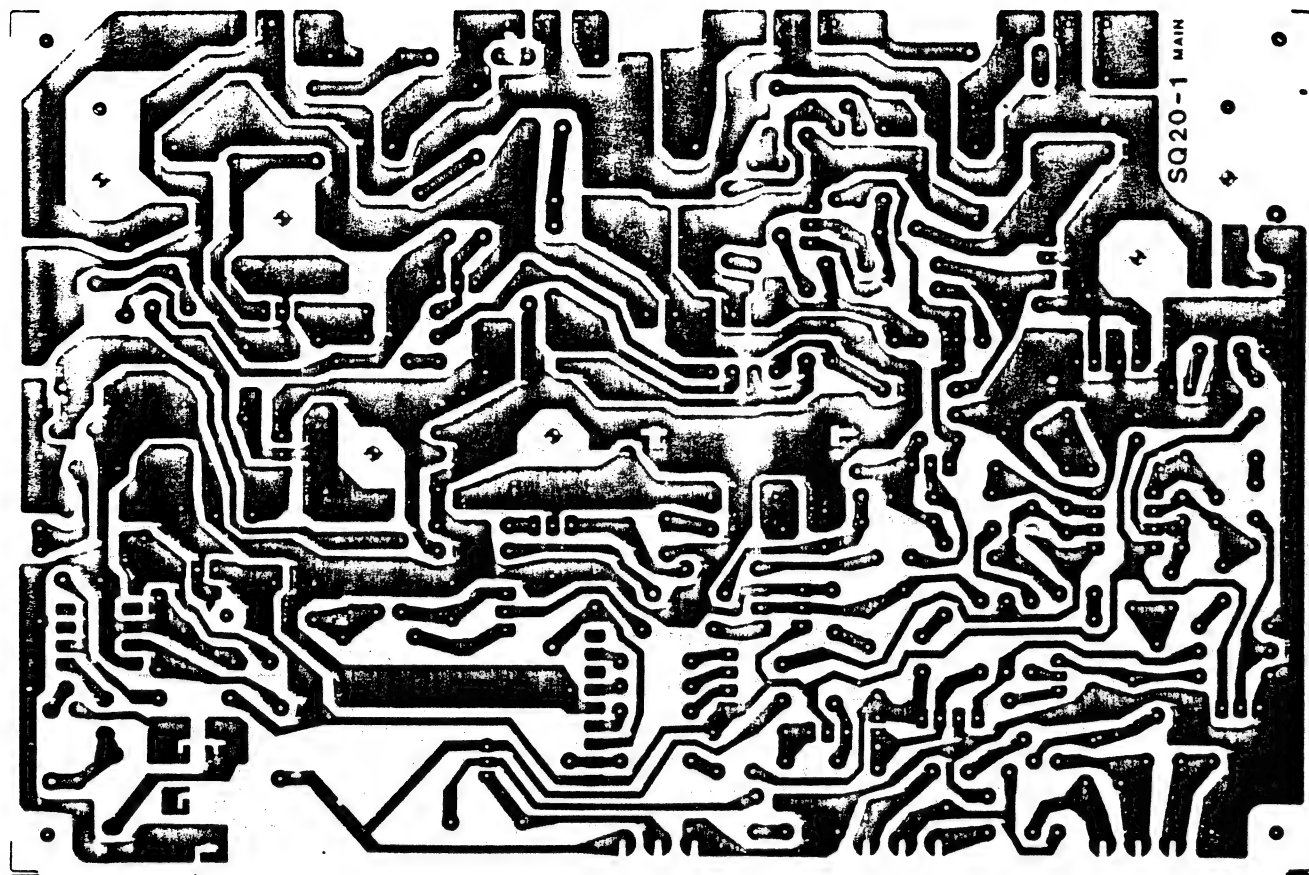


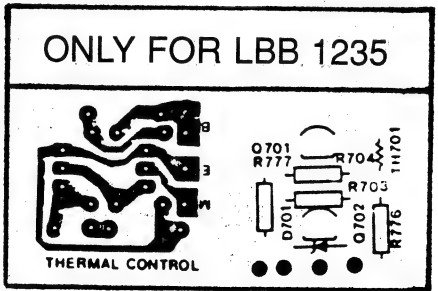
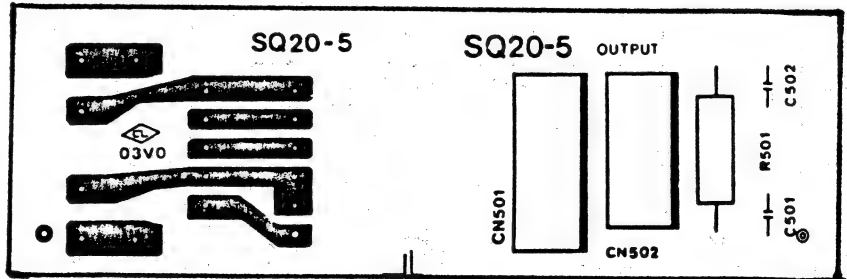
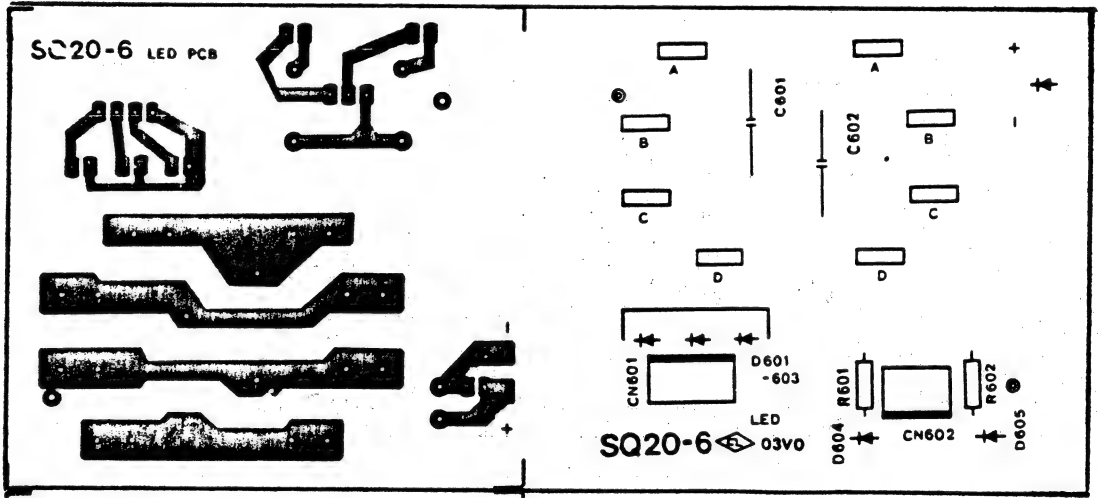
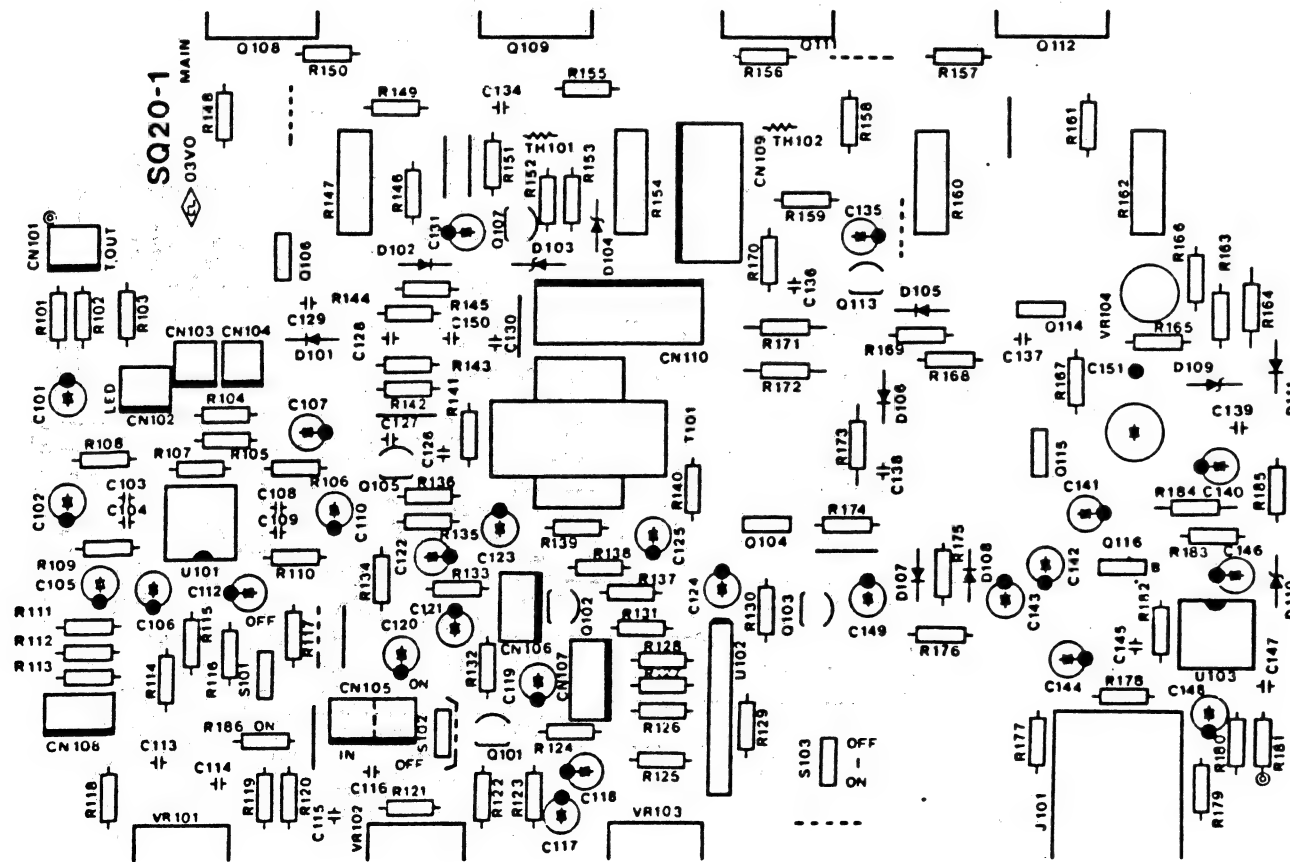
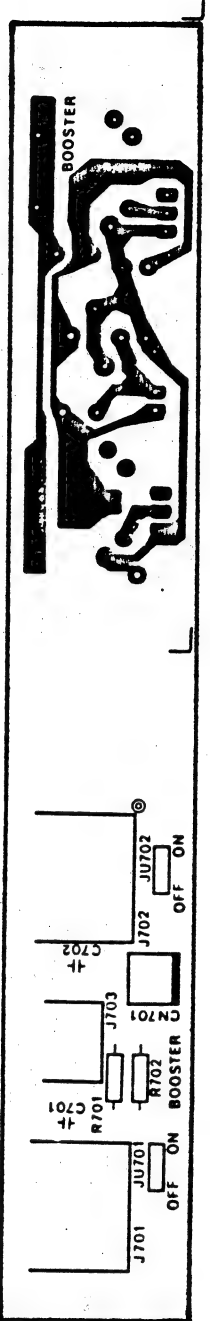
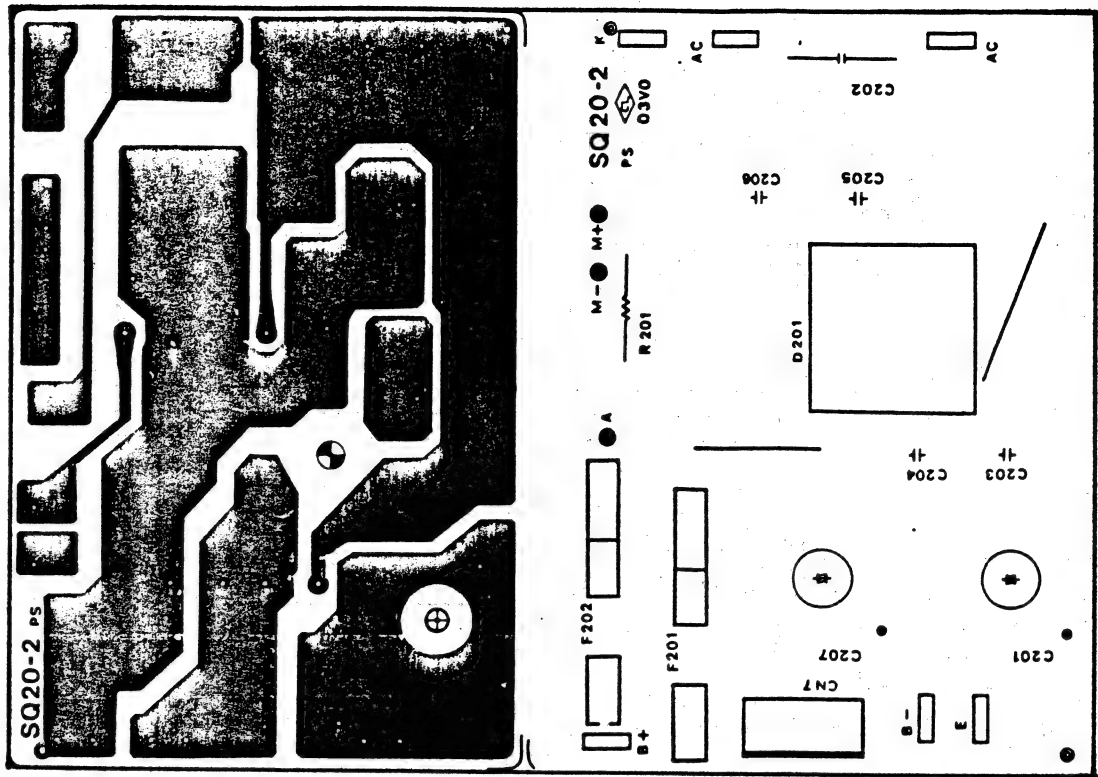
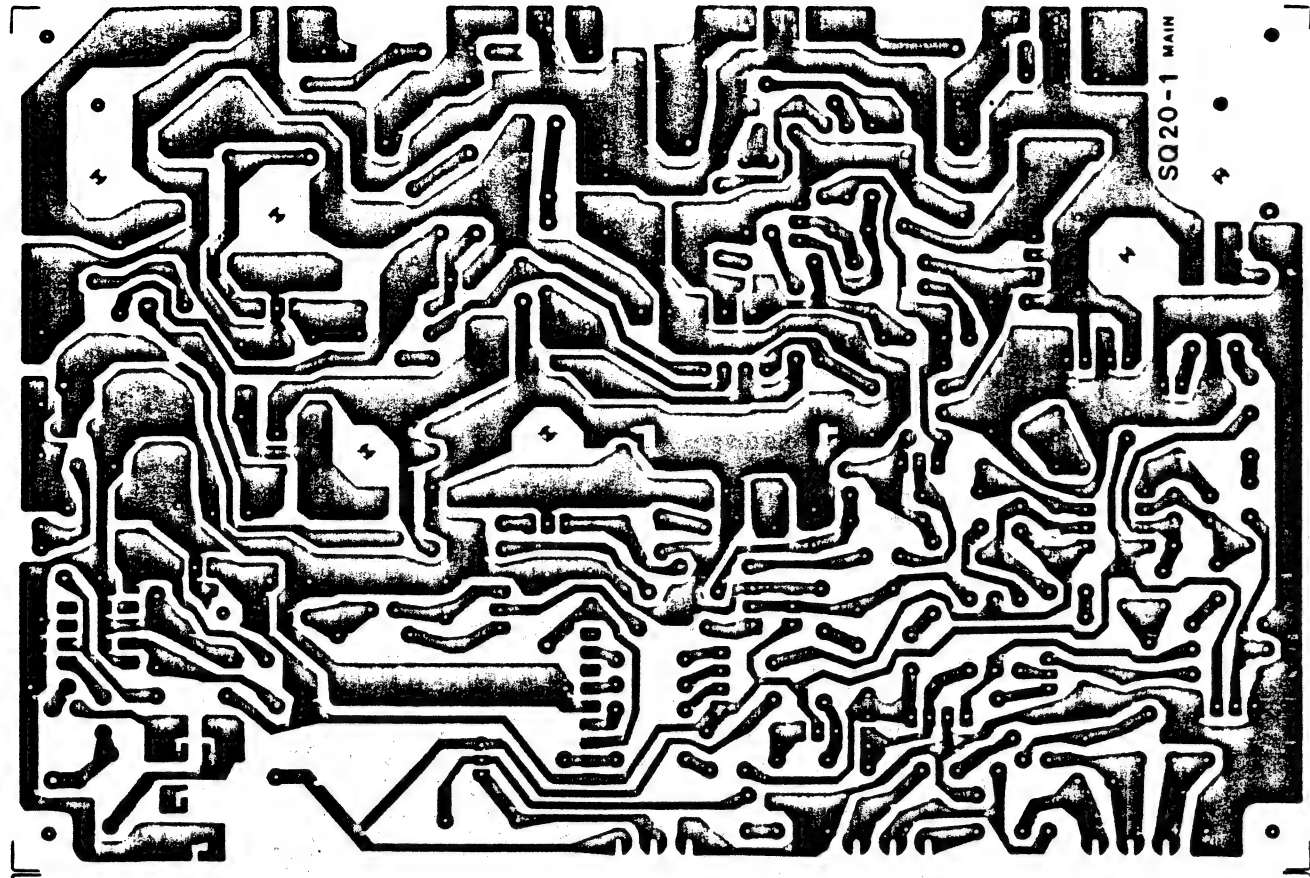
FIGURE 7.10  
LBB 1231/1232/1233  
PCB LAY-OUT PART 1











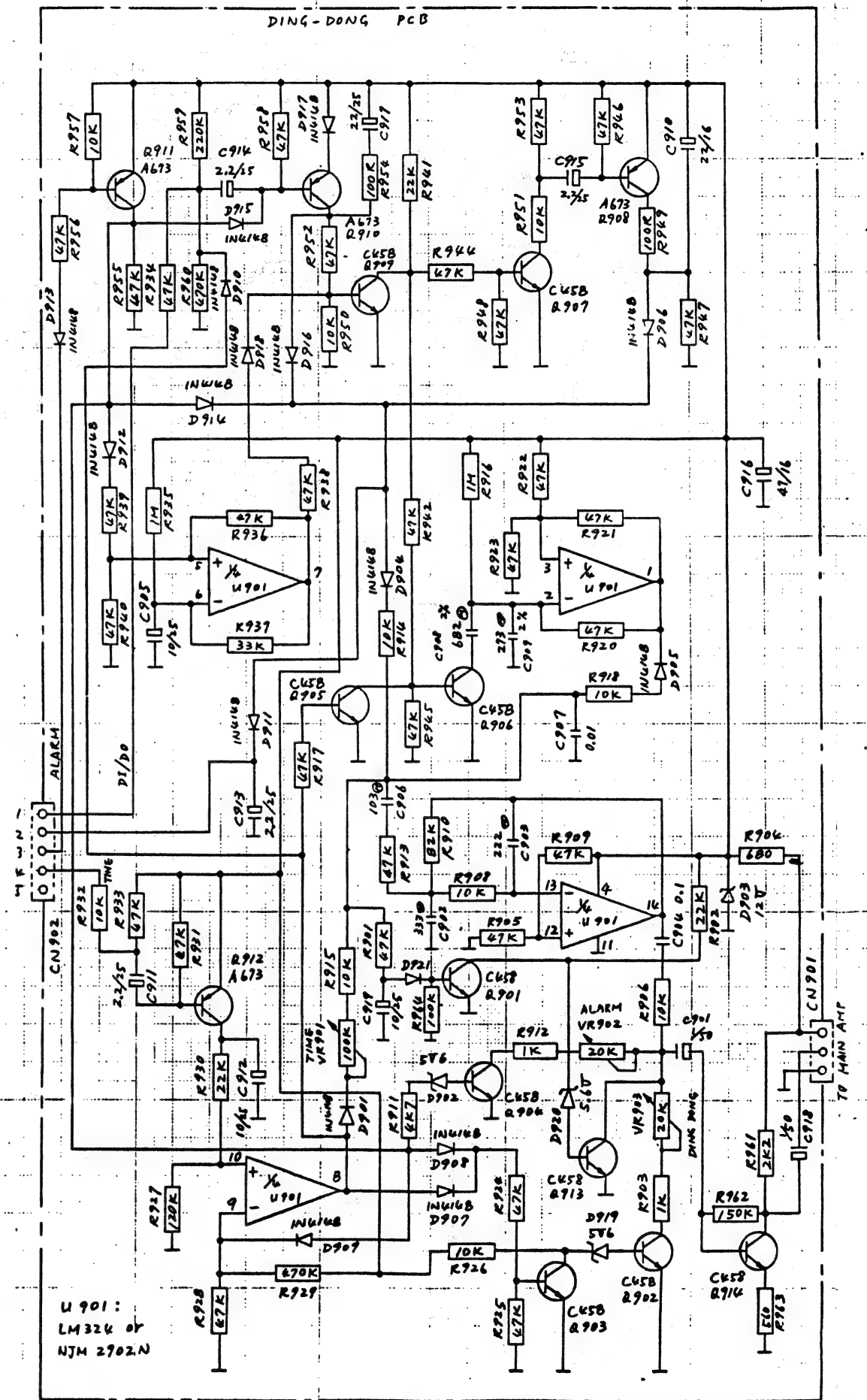
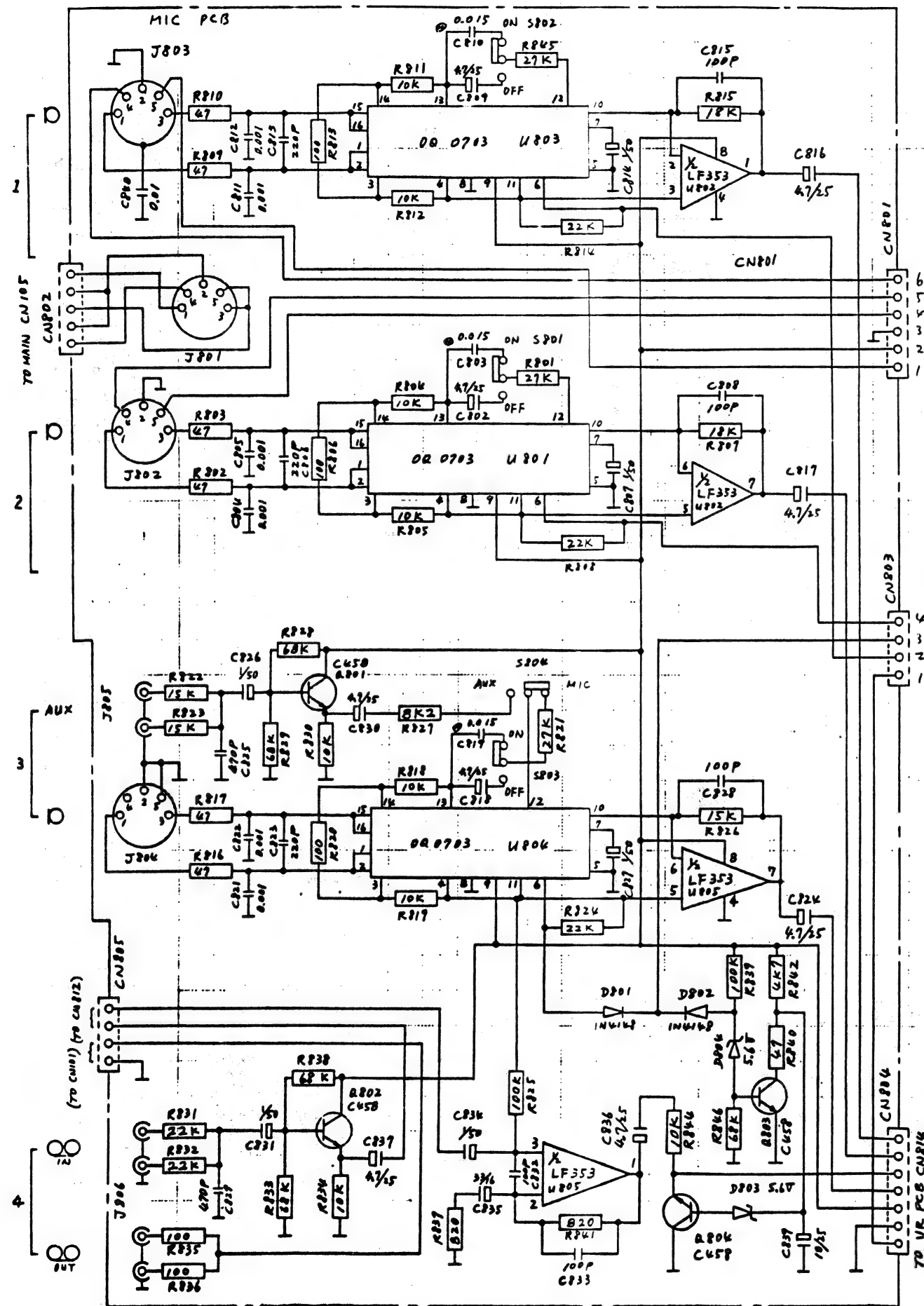
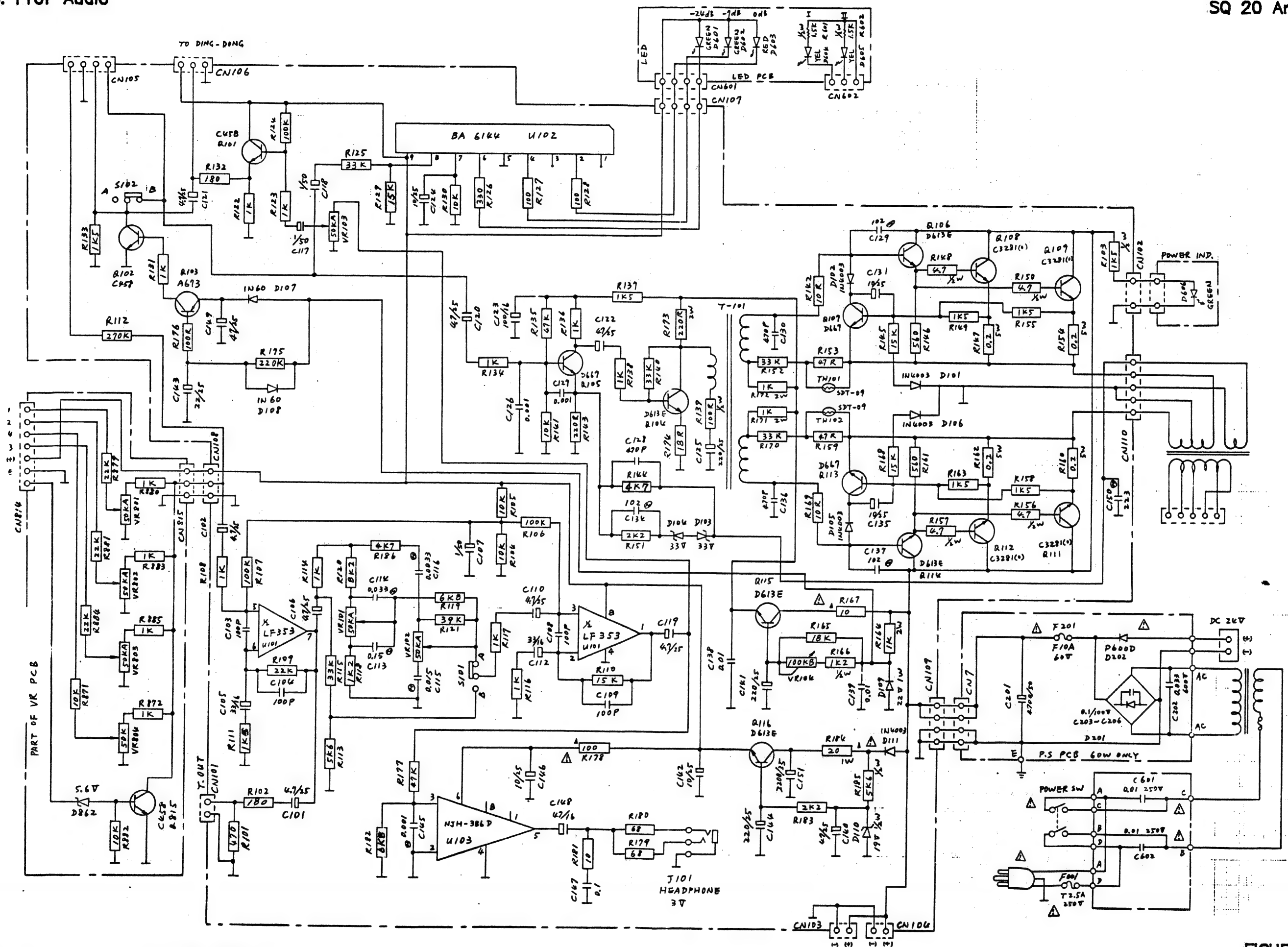


FIGURE 7.14  
LBB 1237/1238  
CIRCUIT DIAGRAM PART 1





Service Documentation 4822 733 24416

FIGURE 7.15  
LBB 1237/1238  
CIRCUIT DIAGRAM PART 2

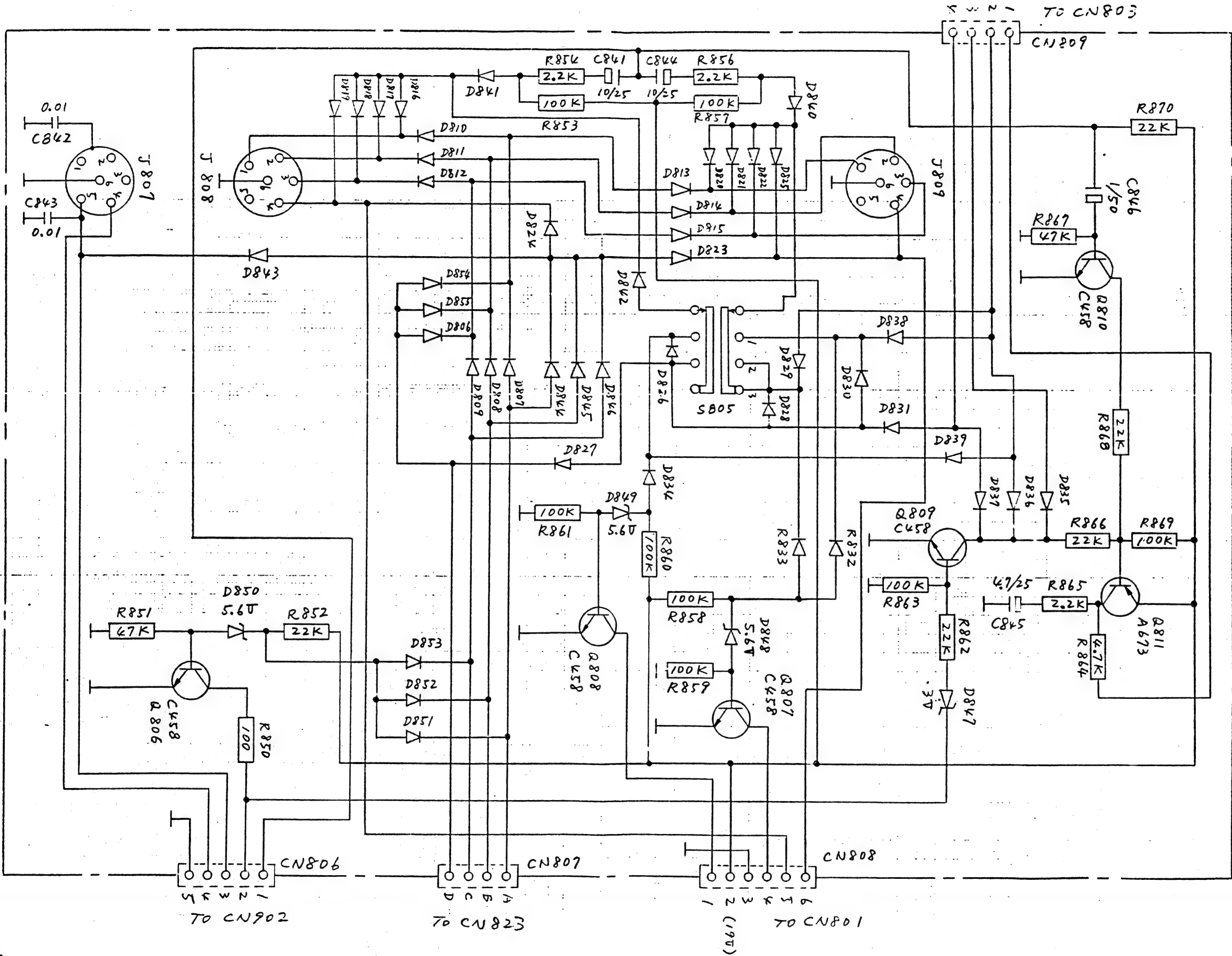


FIGURE 7.16  
LBB 1237/1238  
CIRCUIT DIAGRAM PART 3



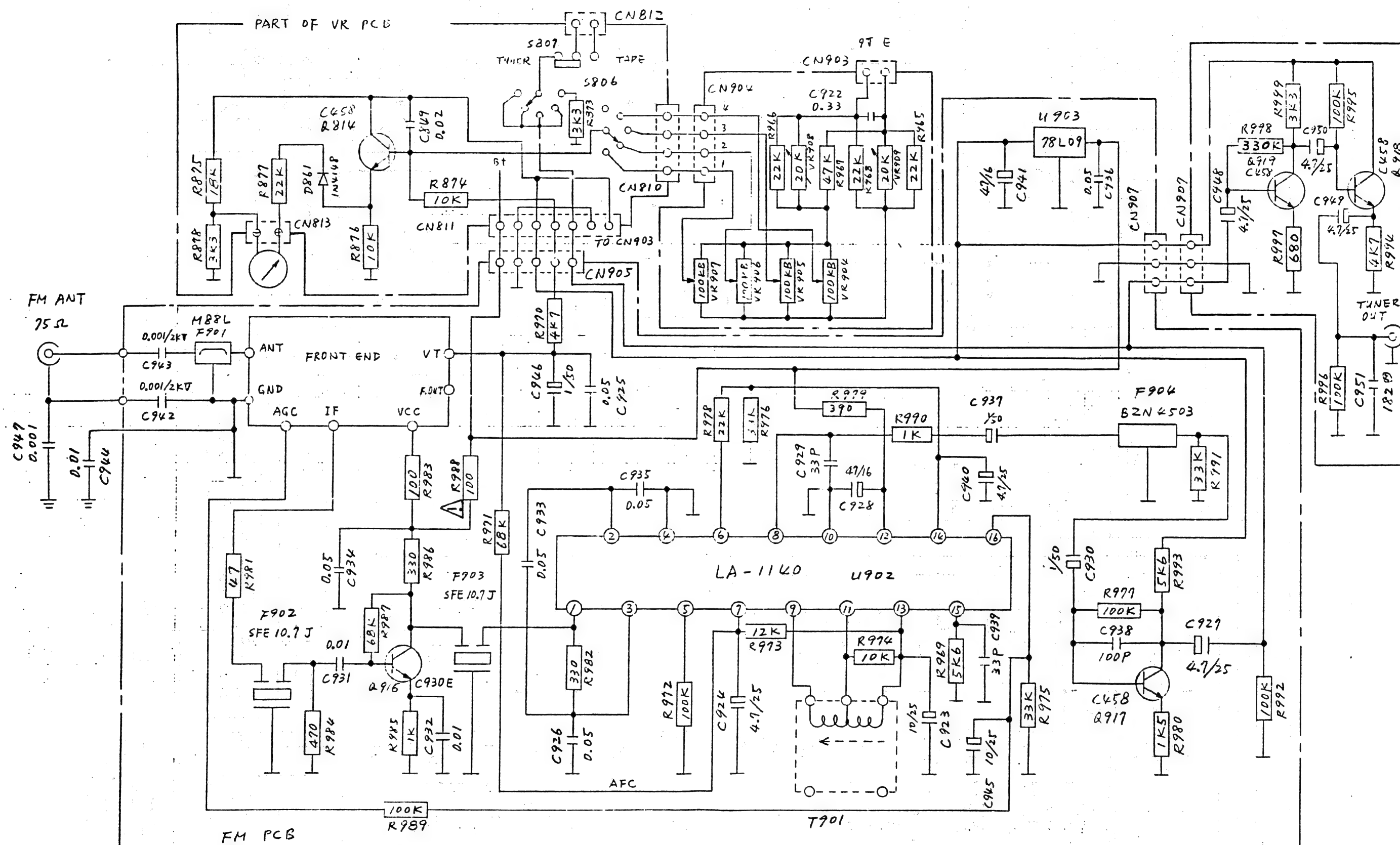
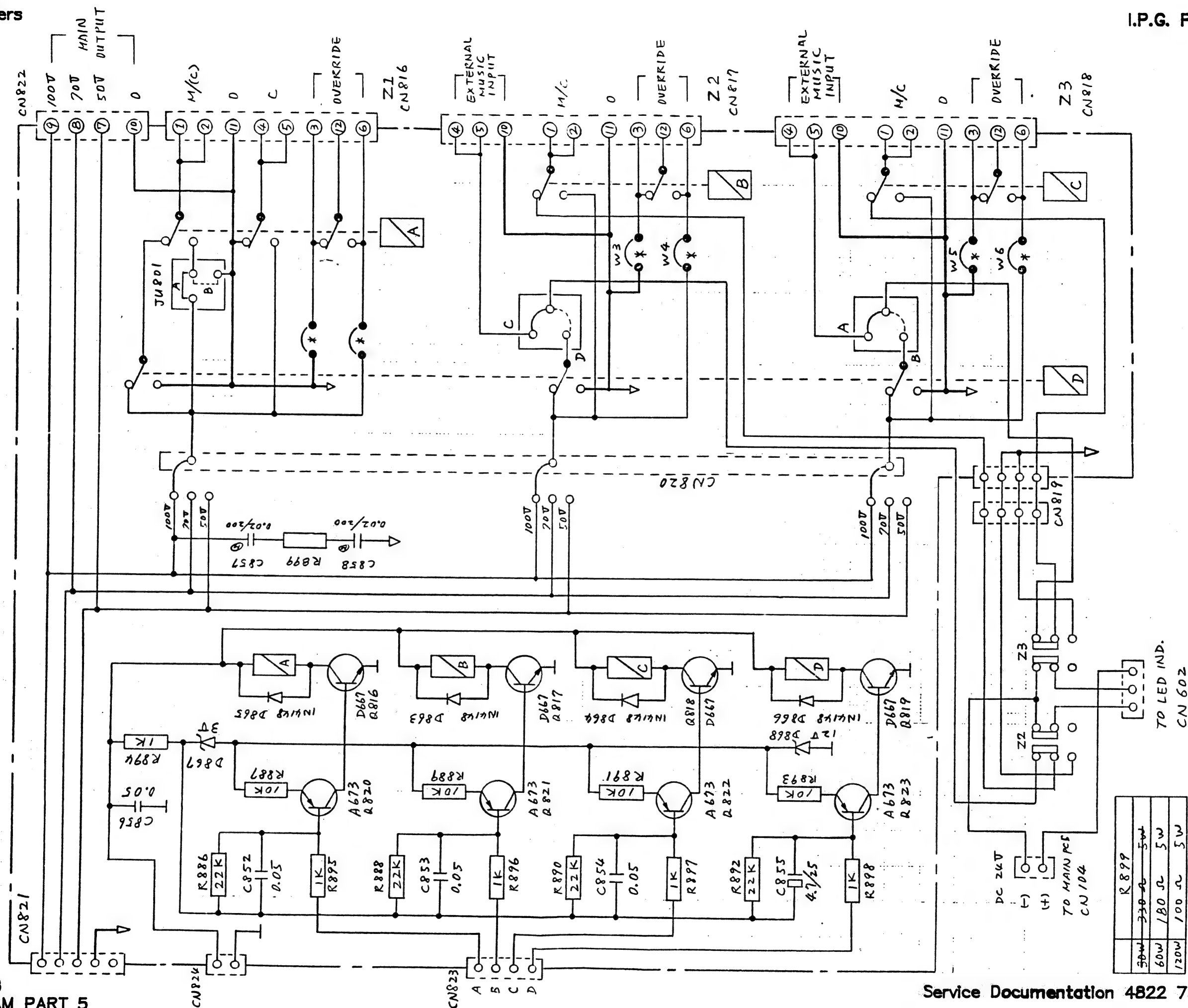


FIGURE 7.18  
LBB 1237/1238  
CIRCUIT DIAGRAM PART 5



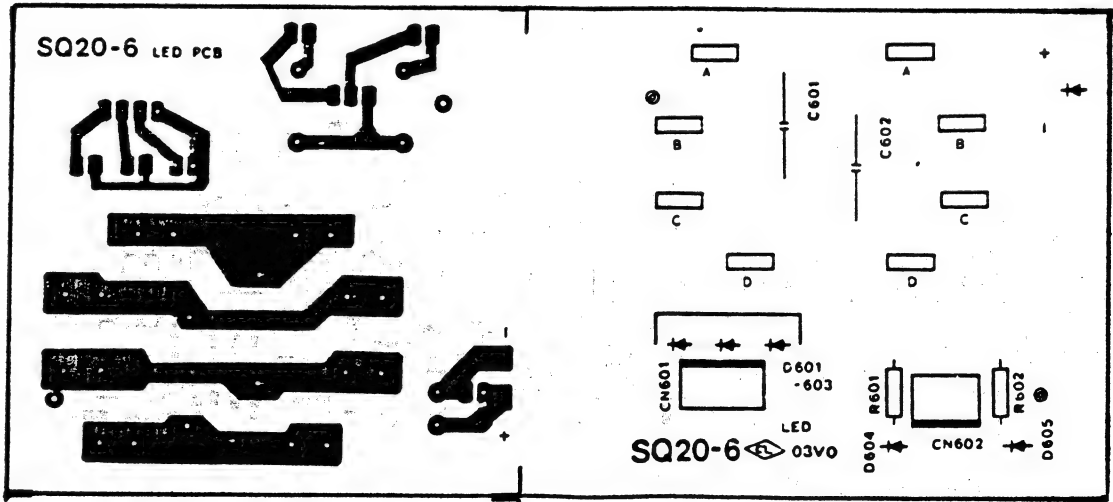
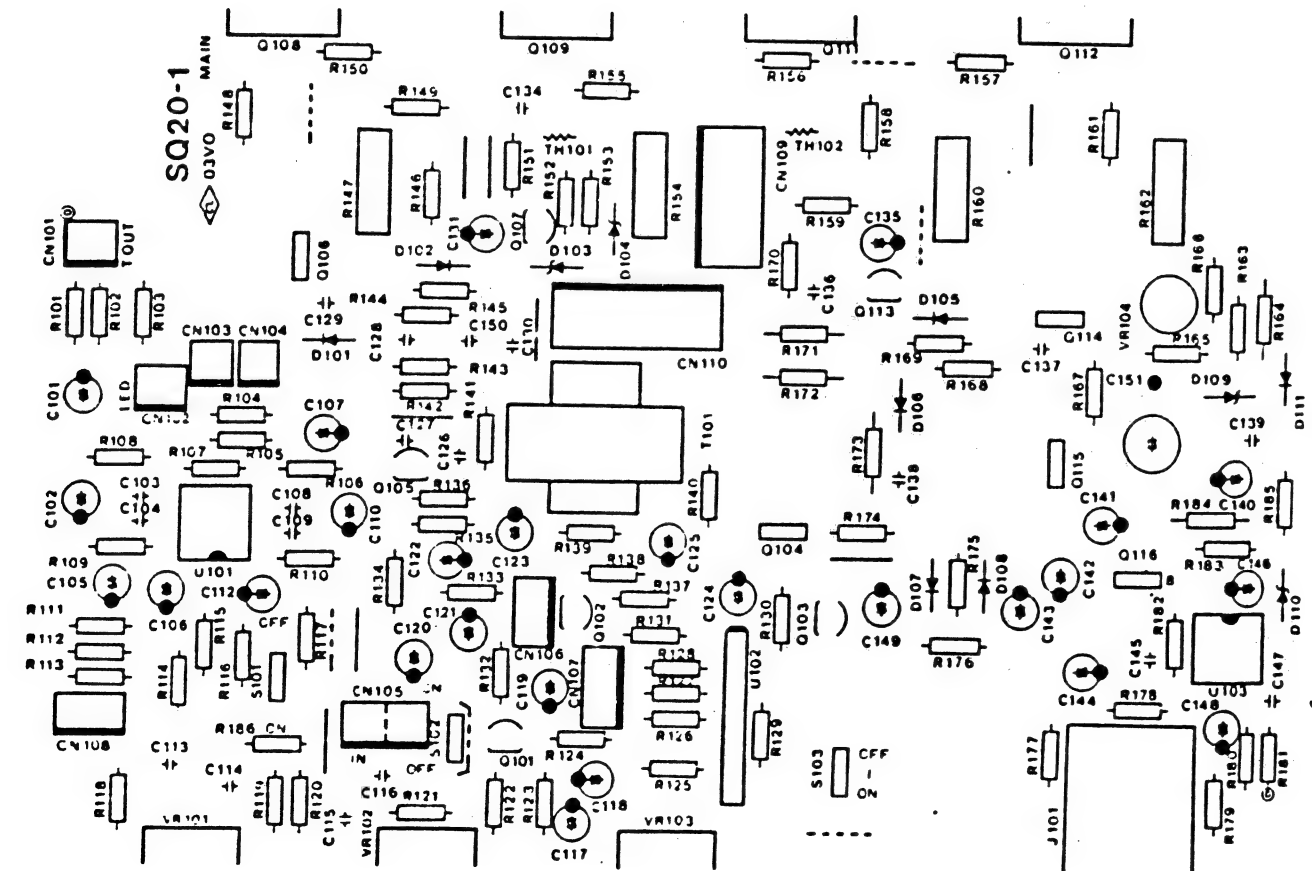
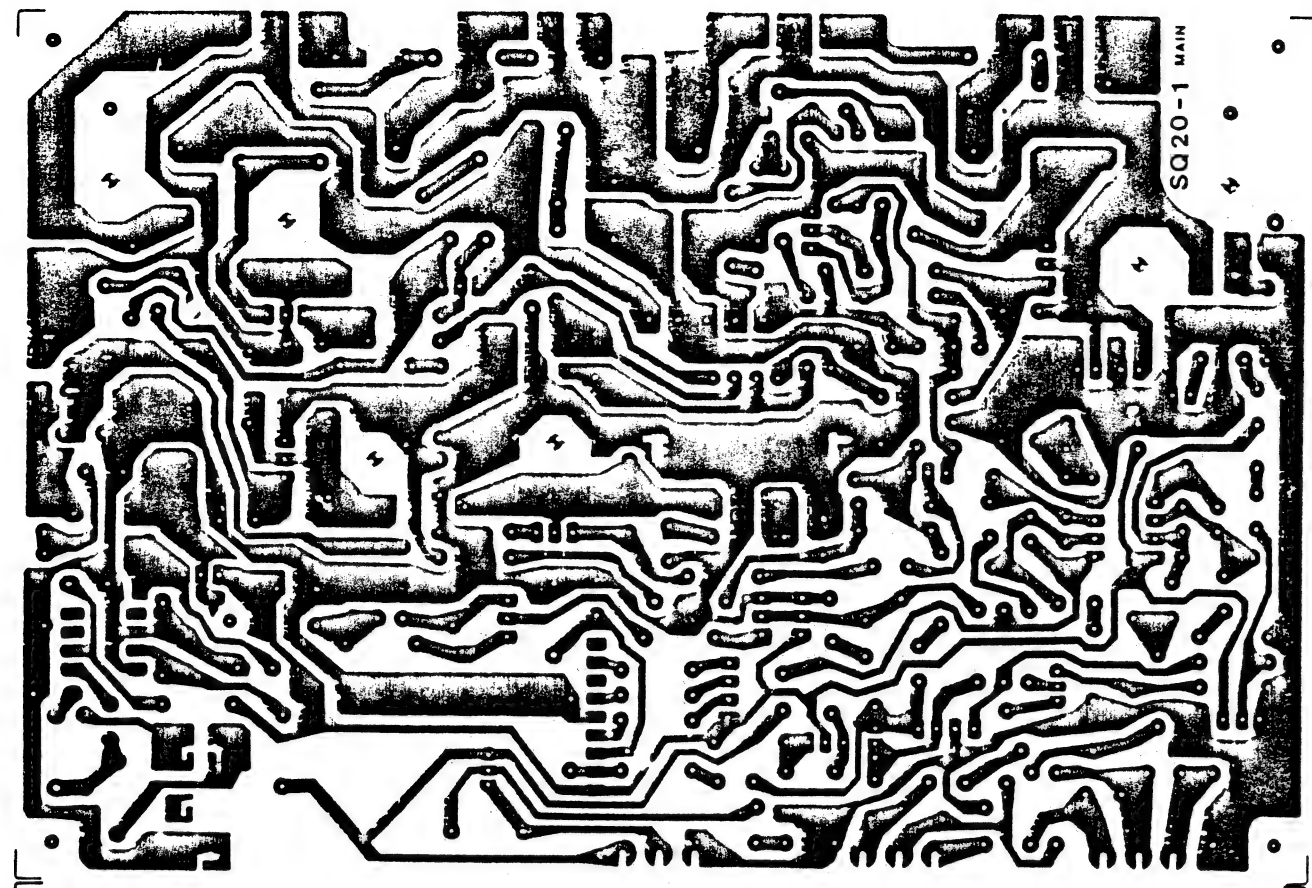


FIGURE 7.19  
LBB 1237/1238  
PCB LAY-OUT PART 1

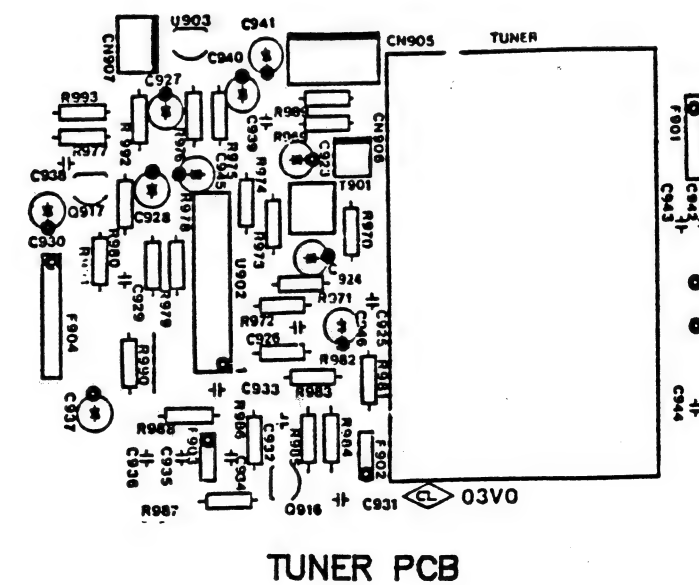
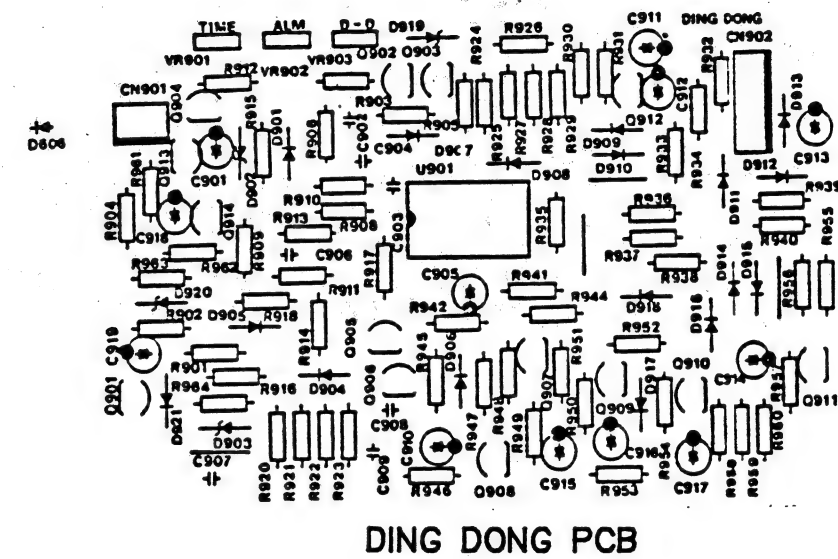
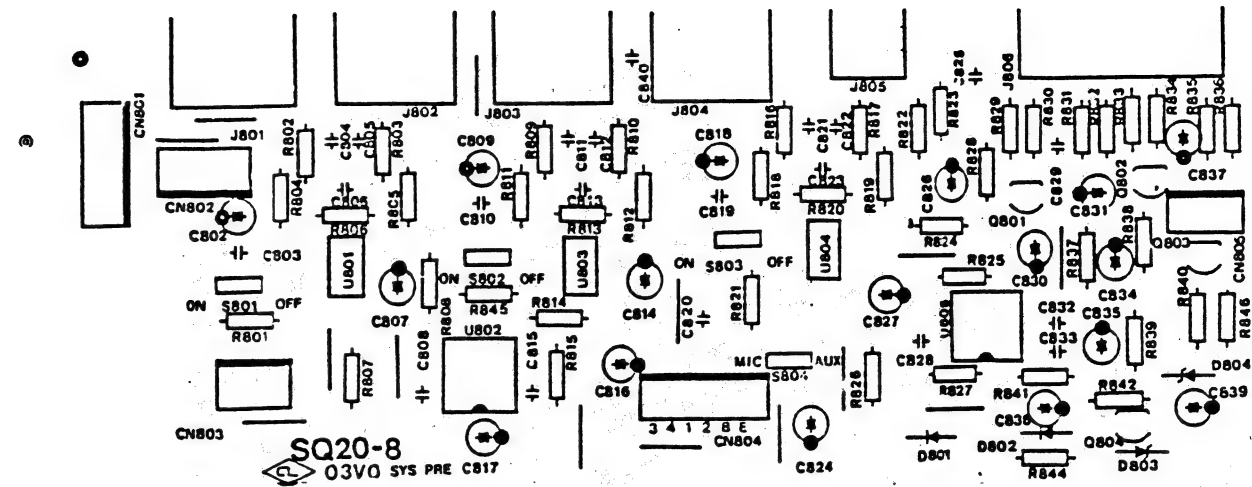
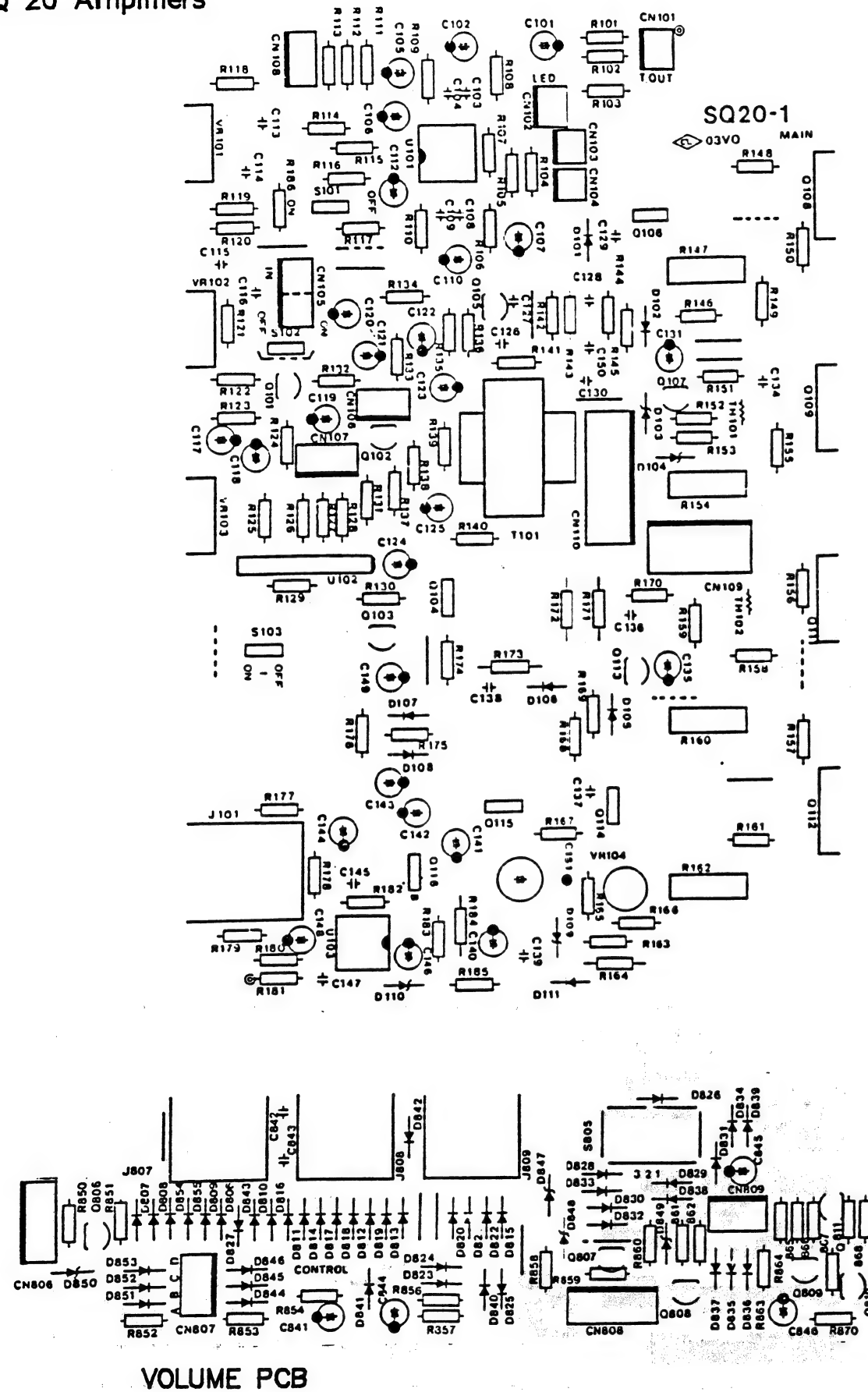
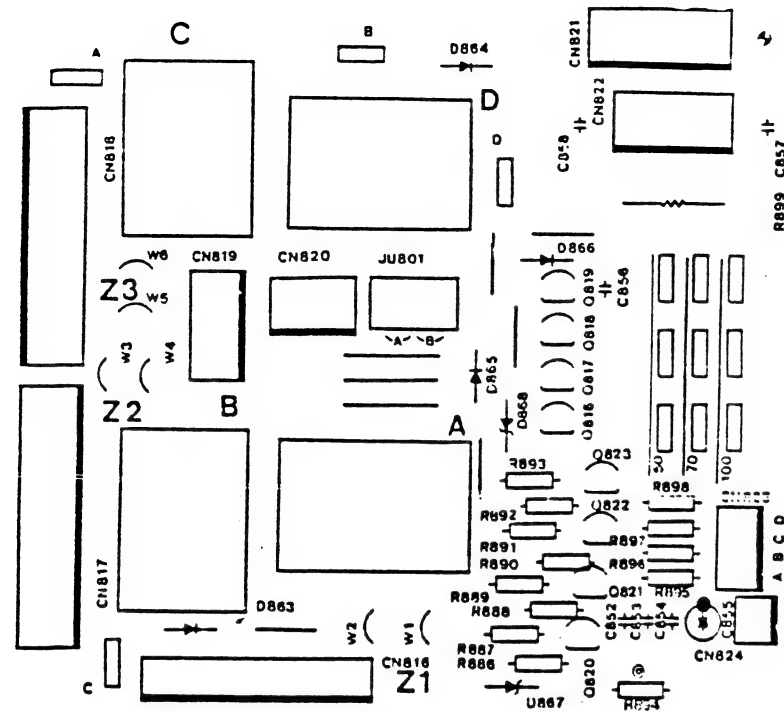
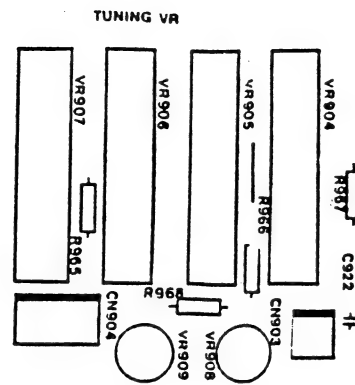


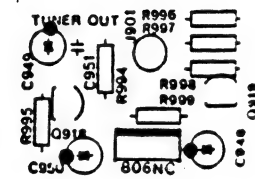
FIGURE 7.20  
LBB 1237/1238  
PCB LAY-OUT PART 2



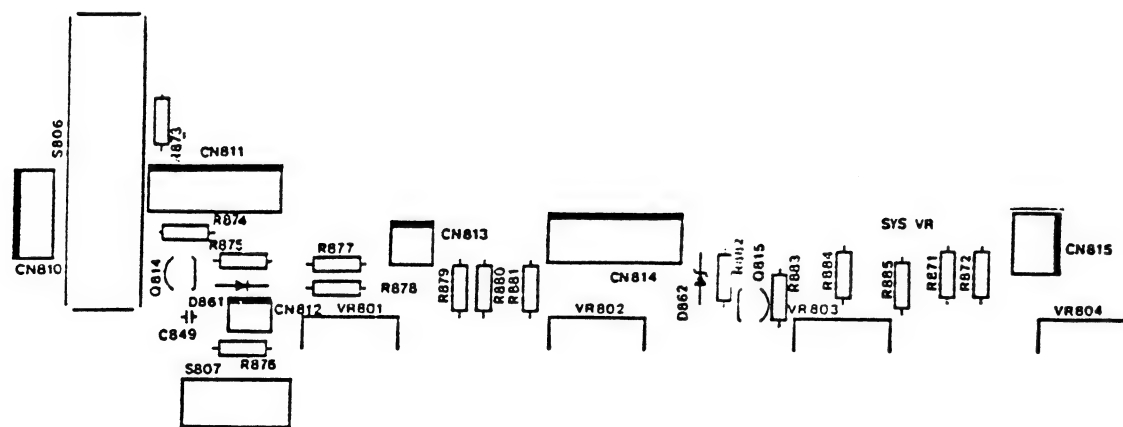
## RELAIS PCB



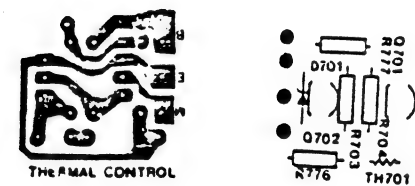
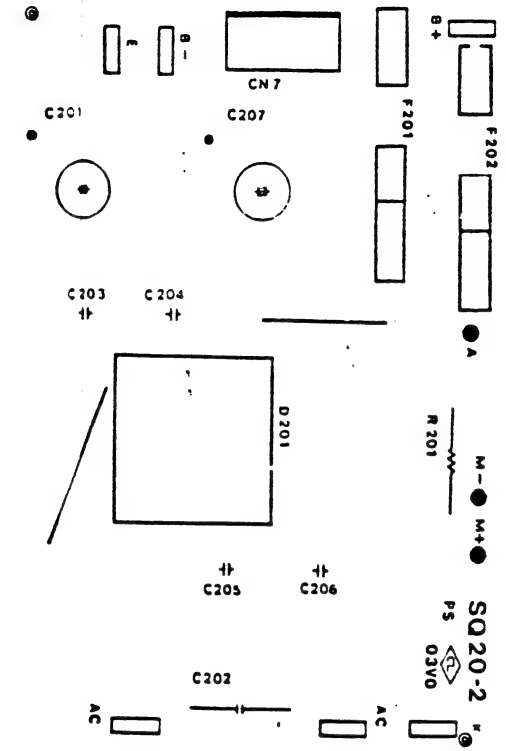
TUNER VR PCB



## TUNER-OUT PCB



VOLUME PCB



ONLY VALID FOR LBB 1238



CONTENTS

## CHAPTER DESCRIPTION

|       |   | <u>PAGE</u> |
|-------|---|-------------|
| 1     | <u>INTRODUCTION</u>                           | 3           |
| 1.1   | GENERAL                                       | 3           |
| 1.2   | THE SQ20 AMPLIFIER RANGE                      | 4           |
| 2     | <u>TECHNICAL DATA</u>                         | 4           |
| 3     | <u>INSTALLATION INSTRUCTIONS</u>              | 4           |
| 4     | <u>CHECKING AND ADJUSTING</u>                 | 6           |
| 5     | <u>CIRCUIT DESCRIPTION</u>                    | 7           |
| 5.1   | DIFFERENCE BETWEEN THE SEVERAL OUTPUT-STAGE'S | 7           |
| 6     | <u>SPARE PARTS</u>                            | 8           |
| 6.1   | RECOMMENDED SPARE-PARTS TOTAL SQ 20 SERIES    | 9           |
| 6.2   | SPARE-PARTS, LISTED PER TYPE-NUMBERS          |             |
| 6.2.1 | LBB 1229/00                                   | 10          |
| 6.2.2 | LBB 1230/00                                   | 11          |
| 6.2.3 | LBB 1231/00                                   | 12          |
| 6.2.4 | LBB 1232/00                                   | 13          |
| 6.2.5 | LBB 1233/00                                   | 14          |
| 6.2.6 | LBB 1234/00                                   | 15          |
| 6.2.7 | LBB 1235/00                                   | 16          |
| 6.2.8 | LBB 1237/00                                   | 17          |
| 6.2.9 | LBB 1238/00                                   | 18          |

CONTENTS (cont'd)7 DRAWINGS

FIGURE: (as appendix)

- 7.1 LBB 1229/00 WIRING-DIAGRAM
- 7.2 LBB 1229/00 CIRCUIT-DIAGRAM \PART1
- 7.3 LBB 1229/00 CIRCUIT-DIAGRAM \PART2
- 7.4 LBB 1229/00 PRINTED CIRCUIT BOARD LAY-OUT
- 7.5 LBB 1230/00 CIRCUIT DIAGRAM
- 7.6 LBB 1230/00 PRINTED CIRCUIT BOARD LAY-OUT
- 7.7 LBB 1230/00 PRINTED CIRCUIT BOARD LAY-OUT
- 7.8 LBB 1231/00, -1232/00, -1233/00 CIRCUIT DIAGRAM \PART1
- 7.9 LBB 1231/00, -1232/00, -1233/00 CIRCUIT DIAGRAM \PART2
- 7.10 LBB 1231/00, LBB 1232/00, LBB 1233/00 PCB LAY-OUT \PART1
- 7.11 LBB 1231/00, LBB 1232/00, LBB 1233/00 PCB LAY-OUT \PART2
- 7.12 LBB 1234/00, LBB 1235/00 CIRCUIT DIAGRAM
- 7.13 LBB 1234/00, LBB 1235/00 PCB LAY-OUT
- 7.14 LBB 1237/00, LBB 1238/00 CIRCUIT DIAGRAM \PART1
- 7.15 LBB 1237/00, LBB 1238/00 CIRCUIT DIAGRAM \PART2
- 7.16 LBB 1237/00, LBB 1238/00 CIRCUIT DIAGRAM \PART3
- 7.17 LBB 1237/00, LBB 1238/00 CIRCUIT DIAGRAM \PART4
- 7.18 LBB 1237/00, LBB 1238/00 CIRCUIT DIAGRAM \PART5
- 7.19 LBB 1237/00, LBB 1238/00 PCB LAY-OUT \PART1
- 7.20 LBB 1237/00, LBB 1238/00 PCB LAY-OUT \PART2
- 7.21 LBB 1237/00, LBB 1238/00 PCB LAY-OUT \PART3

1. CHAPTER 1. INTRODUCTION1.1. GENERAL

The SQ20 range of high performance audio mixing, pre-mixing, booster and system amplifiers have been designed for use in a wide variety of Public Address environments. Ease of operation, combined with good service-accessibility have been optimised in their design.

The total SQ20 range comprises:

|             |                            |
|-------------|----------------------------|
| LBB 1229/00 | Tuner-unit                 |
| LBB 1230/00 | Pre-Mixing Amplifier       |
| LBB 1231/00 | 30 Watt Mixing Amplifier   |
| LBB 1232/00 | 60 Watt Mixing Amplifier   |
| LBB 1233/00 | 120 Watt Mixing Amplifier  |
| LBB 1234/00 | 60 Watt Booster Amplifier  |
| LBB 1235/00 | 120 Watt Booster Amplifier |
| LBB 1237/00 | 60 Watt System Amplifier   |
| LBB 1238/00 | 120 Watt System Amplifier  |
| LBB 1239/00 | Mounting-brackets          |

In this Manual the technical data, installation instructions, spare parts and diagrams of the complete SQ20 range as subscribed above are included, except the callstation(s). The LBB 9427/10, and the new colour-item LBB 9527/10, are described within an additional manual.

Since, for some chapters, information has already been published within the "Datasheets", we will refer to these sheets.

For the SQ20 range, several "Datasheets" are available, combined with this documentation as figures 2.1 upto and including 2.4.

The aim of this Service Manual is mainly to provide in a "Selected component" Second Line Service, because of the ease of install and maintain.

### 1.2. THE SQ20 AMPLIFIER RANGE

See "Datasheets" . This range is enlarged with the SQ 20 - Cassette unit LBB 1228/00, and the Cassette player LBB 1228/50. The details of the LBB 1228/xx were not available at the moment this Service-manual was printed; the details will be published by a Service-Information.

### 2. TECHNICAL DATA

See the "Datasheets" , which are part of this service-manual, as figure 2.1 upto and including 2.4.

### 3. INSTALLATION

#### - Opening the amplifier

Access may be gained to the mains transformer tapings; d.c. fuses; and internally mounted "slide switches", "flying leads" and wire links, by removing the four cross-headed screws (two on each side of the amplifier), and removing the top cover.

Care should be taken not to lose the toothed shake-proof washers which are fitted under the heads of the screws. These washers are required to electrically bond the top cover to the earthed chassis of the amplifier.

For safety reasons these washers must always be fitted when the amplifier is in use.

Note: Before removing the cover, disconnect the amplifier from the mains supply. For safety reasons, it is NOT sufficient just to switch off the amplifier !

#### - 19" Rack Mounting

The range of SQ20 system amplifiers have been designed for both table-top, or 19" rack mounting. Two mounting brackets (LBB 1239/00) and their associated screws, can be ordered for rack mounting the unit.

To attach the mounting brackets, first remove the top cover as described.

Locate the two screw holes provided at both sides of the



amplifier. Using the associated screws, firmly mount the brackets to the amplifier.

- Mains connections and earthing

The system amplifiers are supplied ready for use on 220 V a.c. mains. They are adjustable for use on 110 V, 127 V, 220V -230V and 240V by resoldering the brown wire onto the appropriate tag on the mains transformer (T), covered by a protective shield. Care should be taken to ensure that the wire is firmly soldered to the tag.

**Note:** The amplifier must be tapped for the correct mains voltage, as described, before connecting it to the mains supply.

On delivery the amplifier is supplied with a 2m long 3-core mains lead, terminated at one end with a 2 pole mains plug with earth contacts, and at the other end with a C.E.E connector. In some countries it may be necessary to replace the mains plug with one of a local standard type. A replacement plug must be wired as follows:

|         |                |
|---------|----------------|
| Earth   | - green/yellow |
| Neutral | - blue         |
| Live    | - brown        |

**WARNING!:**

This amplifier must be powered via an earthed mains outlet .

A non restoring thermal fuse, located in the mains transformer, will disconnect the mains supply, should the mains transformer overheat.

**WARNING!:**

This fusible link operates on the primary winding of the mains transformer, and although the mains indicator LED may be off the full mains supply voltage is still present inside the amplifier.

CHECKING AND ADJUSTING

See Instructions for use

NOTE: when replacing the tuner-module of both System-amplifier-models LBB 1237/00 and LBB 1238/00 following only, should be done: adjusting the scale between 88 and 108 MHz. Since this amplifier has been delivered before the moment, this manual was printed, a Service-information "TIP: TI099PA063" has been released regarding these amplifier-models LBB 1237/00 and LBB 1238/00. A brief content of this Service-information-sheet is that "in some system-amplifiers, a tuned signal will be overruled by another stronger signal; corrective action is the change of resistor R971 (68kOhm) into 220kOhm. From serial-number 001361 (LBB 1237/00), and 001441 (LBB 1238/00) onwards, this action already has been implemented.

## 5

CIRCUIT-DESCRIPTION

These amplifiers are repaired at so-called "selected component level", consequently the description would normally be at component-level. Since the technique of the amplifiers is rather simple, it has been decided not to make a complete full-filled description at component-level. The knowledge of the average workshop-engineer should be at this level.

NOTE: Additional details, which are relevant for the following type-numbers:

## 5.1

## DIFFERENCE BETWEEN THE SEVERAL OUTPUT-STAGE'S:

| <u>AMPLIFIER-MODEL</u> |     | <u>30W</u> | <u>60W</u> | <u>120W</u> |
|------------------------|-----|------------|------------|-------------|
| MIXING-                | LBB | 1231/00    | 1232/00    | 1233/00     |
| BOOSTER-               | LBB |            | 1234/00    | 1235/00     |
| SYSTEM-                | LBB |            | 1237/00    | 1238/00     |

| <u>ITEM</u> | <u>30W</u>    | <u>60W</u>    | <u>120W</u>   |        |
|-------------|---------------|---------------|---------------|--------|
| R150, R156  | ----          | ----          | 4,7 $\Omega$  |        |
| R155, R158  | ----          | ----          | 1,5k $\Omega$ |        |
| R149, R166  | 470 $\Omega$  | 1k $\Omega$   | 1,5k $\Omega$ |        |
| R144        | 4,7k $\Omega$ | 5,6k $\Omega$ | 5,6k $\Omega$ |        |
| C201        | 4700uF        | 6800uF        | 4700uF        |        |
| C207        | ----          | ----          | 4700uF        |        |
| F201        | F 5A          | F 8A          | F 10A         |        |
| F202        | ----          | ----          | F 10A         |        |
| F001        | T 1A          | T 1,6A        | T 2,5A        |        |
| R501        | 330 $\Omega$  | 180 $\Omega$  | 100 $\Omega$  | ALL 5W |

SPARE-PARTS

## General:

The spare-parts, as indicated, are so-called "selected components", which means that only a number of the used components have been selected to be a spare-part, in order to reduce the number of obsolescence-risk. This means that, if one cannot repair the unit by using one of the possible components, one normally has to replace the amplifier! The spare-parts are available from Philips Consumer Service.

The mentioned spare-parts, used within the several type's of the amplifier-range, are NOT listed as certain so-called 'pos.' - numbers, but as a type-number of the component, i.e. Q302 (transistor C458) is mentioned as "transistor C458 NPN with a 5322.. number", and NOT as "pos. Q302", with a 5322.. number.

No discrete components, like ordinary resistors and capacitors are mentioned, because of the assumption of the fact that one normally has components like these within a regular workshop.

NOTE: some items within this listing are mentioned as a component with Spare-part-number 0000 000 00000; this means this item will be available as a Spare-part, however at the moment, this Documentation was finished, this item did not have a Philips Consumer Service code-number yet. This information will be added to the Service Documentation, by means of a Service-Information-Sheet (Documentation Change) as soon as the necessary information is available.



## 6.1 RECOMMENDED SPARE-PARTS TOTAL SQ 20 SERIES:

|   |                |
|---|----------------|
| Main switch                                 | 5322 277 11136 |
| Tuner PCB                                   | 5322 214 11157 |
| Power Supply transformer (LBB 1229/1230/00) | 5322 146 10331 |
| Mains connector                             | 5322 265 30876 |
| Battery connector                           | 5322 265 30875 |
| Set handles                                 | 5322 498 50319 |
| VU-Meter                                    | 5322 344 50118 |
| Transistor C485 NPN                         | 5322 130 62667 |
| Transistor A673 PNP                         | 4822 130 41412 |
| Operational amplifier LF 353                | 5322 209 81395 |
| Integrated circuit BA 6144                  | 4822 209 73037 |
| Integrated circuit NJM 386 D                | 5322 209 72458 |
| Diode 1 N 60 Germanium                      | 4822 130 80562 |
| Diode 1 N4148 (BAW 62)                      | 4822 130 30613 |
| Power-transistor C3281                      | 4822 130 60116 |
| Operational amplifier LF 353                | 5322 209 81395 |
| Integrated circuit BA 6144                  | 4822 209 73037 |
| Integrated circuit NJM 386 D                | 5322 209 72458 |
| Operational amplifier LF 353                | 5322 209 81395 |
| Operational amplifier LM 324                | 4822 209 80587 |
| Pre-amplifier integrated circuit OQ 0703    | 5322 209 63972 |
| Thermistor SDT 09                           | 5322 116 30414 |
| Mains transformer PT-SQ20-30W               | 5322 146 10329 |
| Output transformer 30 W                     | 5322 146 10327 |
| Mains transformer PT-SQ20-60W               | 5322 146 10332 |
| Output transformer 60 W                     | 5322 146 10333 |
| Mains transformer PT-SQ20-120W              | 5322 146 10334 |
| Output transformer 120 W                    | 5322 140 60332 |
| Fan-motor                                   | 5322 361 10598 |
| Tuner PCB (LBB 1229/1237/1238/00)           | 5322 214 11157 |
| Fuses: F 0,5 A                              | 4822 253 30017 |
| T 0,5 A                                     | 4822 253 20014 |
| T 1,0 A                                     | 4822 070 31002 |
| T 1,6 A                                     | 4822 070 31602 |
| T 2,0 A                                     | 4822 253 30025 |
| T 2,5 A                                     | 4822 070 32502 |
| T 3,15 A                                    | 4822 070 33152 |
| F 5,0 A                                     | 5322 253 40055 |
| T 5,0 A                                     | 4822 253 30029 |
| F 8,0 A                                     | 5322 253 40034 |
| F 10 A                                      | 5322 253 54035 |

## 6.2 SPARE-PARTS listed per type-number:

## 6.2.1 LBB 1229/00 SQ-20 TUNER-UNIT

|                               |                |
|-------------------------------|----------------|
| Front panel                   | 5322 447 50146 |
| Knob                          | 5322 414 30183 |
| Main switch                   | 5322 277 11136 |
| Potentio-meter                | 5322 101 11138 |
| Jack-plug                     | 5322 265 20515 |
| Phone jack                    | 5322 267 10273 |
| Fuse                          | 5322 253 40055 |
| Tuner PCB                     | 5322 214 11157 |
| Power Supply transformer      | 5322 146 10331 |
| Mains connector               | 5322 265 30876 |
| Battery connector             | 5322 265 30875 |
| Set handles                   | 5322 498 50319 |
| VU-Meter                      | 5322 344 50118 |
| Tuner channel-selector switch | 5322 210 10424 |
| Loudspeaker                   | 0000 000 00000 |
| Potentiometer 100k $\Omega$   | 0000 000 00000 |
| Transistor C485 NPN           | 5322 130 62667 |
| Transistor A673 PNP           | 4822 130 41412 |
| Operational amplifier LF 353  | 5322 209 81395 |
| Integrated circuit BA 6144    | 4822 209 73037 |
| Integrated circuit NJM 386 D  | 5322 209 72458 |
| Diode 1 N 60 Germanium        | 4822 130 80562 |
| Diode 1 N4148 (BAW 62)        | 4822 130 30613 |

## 6.2.2 LBB 1230/00 SQ-20 PRE-MIXING AMPLIFIER

|   |                |
|---|----------------|
| Front panel                                 | 5322 447 50144 |
| Knob  | 5322 414 30152 |
| Knob  | 5322 414 30183 |
| Main switch                                 | 5322 277 11136 |
| Potentiometer RK163111A152                  | 5322 101 11139 |
| Potentiometer RK163111R376                  | 5322 101 11138 |
| Jack plug PJ-202NP                          | 5322 265 20515 |
| Phone Jack HTJ064-03                        | 5322 267 10273 |
| Fuses: F 0,5 A                              | 4822 253 30017 |
| T 1 A                                       | 4822 070 31002 |
| T 0,5 A                                     | 4822 253 20014 |
| DIN 5 pol DJ-005                            | 5322 267 10272 |
| Mains transformer PT SQ.20-PM               | 5322 146 10331 |
| Mains connector 4300-1002                   | 5322 265 30876 |
| Battery-connection (incl. fuse) DT55A02W-02 | 5322 265 30875 |
| Handle, 2 pcs. incl. screws                 | 5322 498 50319 |
| Transistor C485 NPN                         | 5322 130 62667 |
| Transistor A673 PNP                         | 4822 130 41412 |
| Operational amplifier LF 353                | 5322 209 81395 |
| Integrated circuit BA 6144                  | 4822 209 73037 |
| Integrated circuit NJM 386 D                | 5322 209 72458 |
| Diode 1 N 60 Germanium                      | 4822 130 80562 |
| Diode 1 N4148 (BAW 62)                      | 4822 130 30613 |

## 6.2.3 SPARE PARTS LBB 1231/00 SQ-20 30 W MIXING AMPLIFIER

|  |                |
|--|----------------|
| Front panel                              | 5322 447 50144 |
| Knob 18                                  | 5322 414 30152 |
| Knob 14                                  | 5322 414 30183 |
| Main switch                              | 5322 277 11136 |
| Potentiometer A152                       | 5322 101 11139 |
| Potentiometer R376                       | 5322 101 11138 |
| Jack plug                                | 5322 265 20515 |
| 5P DIN                                   | 5322 267 10272 |
| Phone Jack                               | 5322 267 10273 |
| Fuses: F 5,0 A                           | 5322 253 40055 |
| T 2,0 A                                  | 4822 253 30025 |
| T 1,0 A                                  | 4822 070 31002 |
| Mains transformer PT-SQ20-30W            | 5322 146 10329 |
| Mains connector                          | 5322 265 30876 |
| Battery conn. incl. fuse                 | 5322 265 30875 |
| Thermistor SDT 09                        | 5322 116 30414 |
| Output transformer 30 W                  | 5322 146 10327 |
| Handle 2pcs. incl. screws                | 5322 498 50319 |
| Made-and-lock 6 pol.                     | 5322 267 40995 |
| Transistor C485 NPN                      | 5322 130 62667 |
| Transistor A673 PNP                      | 4822 130 41412 |
| Transistor D613E NPN                     | 5322 146 10328 |
| Transistor D667 NPN                      | 5322 146 10329 |
| Power-transistor C3281                   | 4822 130 60116 |
| Pre-amplifier integrated circuit OQ 0703 | 5322 209 63972 |
| Operational amplifier LF 353             | 5322 209 81395 |
| Integrated circuit BA 6144               | 4822 209 73037 |
| Integrated circuit NJM 386 D             | 5322 209 72458 |
| Diode 1 N 60 Germanium                   | 4822 130 80562 |
| Diode D 1502                             | 5322 130 82533 |
| Diode 1 N4148 (BAW 62)                   | 4822 130 30613 |



## 6.2.4 SPARE PARTS LBB 1232/00 SQ-20 60 W MIXING AMPLIFIER

|  |                |
|--|----------------|
| Front panel                              | 5322 447 50144 |
| Knob 18                                  | 5322 414 30152 |
| Knob 14                                  | 5322 414 30183 |
| Main switch                              | 5322 277 11136 |
| Potentiometer A152                       | 5322 101 11139 |
| Potentiometer R376                       | 5322 101 11138 |
| Jack plug                                | 5322 265 20515 |
| Phone JACK                               | 5322 267 10273 |
| 5P DIN                                   | 5322 267 10272 |
| Fuses: F 8,0 A                           | 5322 253 40034 |
| T 3,15 A                                 | 4822 070 33152 |
| T 1,6 A                                  | 4822 070 31602 |
| Mains transformer 60 W                   | 5322 146 10332 |
| Mains connector                          | 5322 265 30876 |
| Battery conn. incl. fuse                 | 5322 265 30875 |
| Thermistor SDT 09                        | 5322 116 30414 |
| Output transformer 60 W                  | 5322 146 10333 |
| Handle 2pcs. incl. screws                | 5322 498 50319 |
| Made-and-lock 6 pol.                     | 5322 267 40995 |
| Transistor C485 NPN                      | 5322 130 62667 |
| Transistor A673 PNP                      | 4822 130 41412 |
| Transistor D613E NPN                     | 5322 146 10328 |
| Transistor D667 NPN                      | 5322 146 10329 |
| Power-transistor C3281                   | 4822 130 60116 |
| Pre-amplifier integrated circuit OQ 0703 | 5322 209 63972 |
| Operational amplifier LF 353             | 5322 209 81395 |
| Integrated circuit BA 6144               | 4822 209 73037 |
| Integrated circuit NJM 386 D             | 5322 209 72458 |
| Diode 1 N 60 Germanium                   | 4822 130 80562 |
| Diode D 1502                             | 5322 130 82533 |
| Diode 1 N4148 (BAW 62)                   | 4822 130 30613 |

## 6.2.5 SPARE PARTS LBB 1233/00 SQ-20 120 W MIXING AMPLIFIER

|  |                |
|--|----------------|
| Front panel                              | 5322 447 50144 |
| Knob 18                                  | 5322 414 30152 |
| Knob 14                                  | 5322 414 30183 |
| Main switch                              | 5322 277 11136 |
| Potentiometer                            | 5322 101 11139 |
| Potentiometer Switch                     | 5322 101 11138 |
| Jack plug                                | 5322 265 20515 |
| Phone jack                               | 5322 267 10273 |
| 5P DIN                                   | 5322 267 10272 |
| Fuses: F 10 A                            | 5322 253 54035 |
| T 5,0 A                                  | 4822 253 30029 |
| T 2,5 A                                  | 4822 070 32502 |
| Mains transformer 120 W                  | 5322 146 10334 |
| Mains connector                          | 5322 265 30876 |
| Battery conn. incl. fuse                 | 5322 265 30875 |
| Fan-motor                                | 5322 361 10598 |
| Thermistor SDT 09                        | 5322 116 30414 |
| Output transformer 120 W                 | 5322 140 60332 |
| Handle 2pcs. incl. screws                | 5322 498 50319 |
| Made-and-lock 6 pol.                     | 5322 267 40995 |
| Transistor C485 NPN                      | 5322 130 62667 |
| Transistor A673 PNP                      | 4822 130 41412 |
| Transistor D613E NPN                     | 5322 146 10328 |
| Transistor D667 NPN                      | 5322 146 10329 |
| Power-transistor C3281                   | 4822 130 60116 |
| Pre-amplifier integrated circuit OQ 0703 | 5322 209 63972 |
| Operational amplifier LF 353             | 5322 209 81395 |
| Integrated circuit BA 6144               | 4822 209 73037 |
| Integrated circuit NJM 386 D             | 5322 209 72458 |
| Diode 1 N 60 Germanium                   | 4822 130 80562 |
| Diode D 1502                             | 5322 130 82533 |
| Diode 1 N4148 (BAW 62)                   | 4822 130 30613 |

## 6.2.6 SPARE PARTS LBB 1234/00 SQ-20 60 W BOOSTER AMPLIFIER

|                              |                |
|------------------------------|----------------|
| Front panel                  | 5322 447 50143 |
| Knob 18                      | 5322 414 30152 |
| Jack-plug                    | 5322 265 20515 |
| Phone Jack                   | 5322 267 10273 |
| 5P DIN                       | 5322 267 10272 |
| Main switch                  | 5322 277 11136 |
| Handle (2 pcs. incl. screws) | 5322 498 50319 |
| Made-and-lock 6 pol.         | 5322 267 40995 |
| Mains connector, incl fuse   | 5322 265 30876 |
| Battery conn. incl. fuse     | 5322 265 30875 |
| Fuses: F 8,0 A               | 5322 253 40034 |
| T 3,15 A                     | 4822 070 33152 |
| T 1,6 A                      | 4822 070 31602 |
| Mains transformer 60 W       | 5322 146 10332 |
| Output transformer 60 W      | 5322 146 10333 |
| Thermistor SDT 09            | 5322 116 30414 |
| Potentiometer                | 5322 101 11138 |
| Transistor C485 NPN          | 5322 130 62667 |
| Transistor A673 PNP          | 4822 130 41412 |
| Transistor D613E NPN         | 5322 146 10328 |
| Transistor D667 NPN          | 5322 146 10329 |
| Power-transistor C3281       | 4822 130 60116 |
| Operational amplifier LF 353 | 5322 209 81395 |
| Integrated circuit BA 6144   | 4822 209 73037 |
| Integrated circuit NJM 386 D | 5322 209 72458 |
| Diode 1 N 60 Germanium       | 4822 130 80562 |
| Diode D 1502                 | 5322 130 82533 |
| Diode 1 N4148 (BAW 62)       | 4822 130 30613 |

## 6.2.7 SPARE PARTS LBB 1235/00 SQ-20 120 W BOOSTER AMPLIFIER

|                              |                |
|------------------------------|----------------|
| Front panel                  | 5322 447 50143 |
| Knob 18                      | 5322 414 30152 |
| Jack-plug                    | 5322 265 20515 |
| Phone Jack                   | 5322 267 10273 |
| 5P DIN                       | 5322 267 10272 |
| Main switch                  | 5322 277 11136 |
| Handle (2 pcs. incl. screws) | 5322 498 50319 |
| Made-and-lock 6 pol.         | 5322 267 40995 |
| Mains connector, incl fuse   | 5322 265 30876 |
| Battery conn. incl. fuse     | 5322 265 30875 |
| Fuses: F 10 A                | 5322 253 54035 |
| T 5,0 A                      | 4833 253 30029 |
| T 2,5 A                      | 4822 070 32502 |
| Fan-motor                    | 5322 361 10598 |
| Mains transformer 120 W      | 5322 146 10334 |
| Output transformer 120 W     | 5322 140 60332 |
| Thermistor SDT 09            | 5322 116 30414 |
| Potentiometer                | 5322 101 11138 |
| Transistor C485 NPN          | 5322 130 62667 |
| Transistor A673 PNP          | 4822 130 41412 |
| Transistor D613E NPN         | 5322 146 10328 |
| Transistor D667 NPN          | 5322 146 10329 |
| Power-transistor C3281       | 4822 130 60116 |
| Operational amplifier LF 353 | 5322 209 81395 |
| Integrated circuit BA 6144   | 4822 209 73037 |
| Integrated circuit NJM 386 D | 5322 209 72458 |
| Diode 1 N 60 Germanium       | 4822 130 80562 |
| Diode D 1502                 | 5322 130 82533 |
| Diode 1 N4148 (BAW 62)       | 4822 130 30613 |

## 6.2.8 SPARE PARTS LBB 1237/00 SQ-20 60 W SYSTEM AMPLIFIER

|  |                |
|--|----------------|
| Front panel                              | 5322 447 50145 |
| Knob 18                                  | 5322 414 30152 |
| Knob 14                                  | 5322 414 30183 |
| Knob 10 x 7                              | 5322 414 20393 |
| Phone Jack                               | 5322 267 10273 |
| Jack-plug 2 pol.                         | 5322 265 20515 |
| Jack 4 pol.                              | 5322 265 20517 |
| DIN 5 pol.                               | 5322 267 10272 |
| DIN 6 pol.                               | 5322 267 10275 |
| Main switch                              | 5322 277 11136 |
| Handle (2 pcs. incl. screws)             | 5322 498 50319 |
| Made-and-lock 9 pol.                     | 5322 267 40999 |
| Made-and-lock 12 pol.                    | 5322 267 41001 |
| Mains connector, incl fuse               | 5322 265 30876 |
| Fuses: F 8,0 A                           | 5322 253 40034 |
| T 3,15 A                                 | 4822 070 33152 |
| T 1,6 A                                  | 4822 070 31602 |
| Mains transformer 60 W                   | 5322 146 10332 |
| Output transformer 60 W                  | 5322 146 10333 |
| Tuner channel selector                   | 5322 210 10424 |
| Battery conn. (incl. fuse)               | 5322 265 30875 |
| Moving coil-meter                        | 5322 344 50118 |
| Relais 2 pol.                            | 5322 280 20483 |
| Relais 4 pol.                            | 5322 280 20484 |
| Potentiometer A152                       | 5322 101 11139 |
| Potentiometer A376                       | 5322 101 11144 |
| Thermistor SDT 09                        | 5322 116 30414 |
| Zone switch 2 channel                    | 5322 276 20512 |
| Switch tuner/tape                        | 5322 277 21507 |
| Transistor C485 NPN                      | 5322 130 62667 |
| Transistor A673 PNP                      | 4822 130 41412 |
| Transistor D613E NPN                     | 5322 146 10328 |
| Transistor D667 NPN                      | 5322 146 10329 |
| Power-transistor C3281                   | 4822 130 60116 |
| Pre-amplifier integrated circuit OQ 0703 | 5322 209 63972 |
| Operational amplifier LF 353             | 5322 209 81395 |
| Operational amplifier LM 324             | 4822 209 80587 |
| Integrated circuit BA 6144               | 4822 209 73037 |
| Integrated circuit NJM 386 D             | 5322 209 72458 |



SPARE PARTS LBB 1237/00 SQ-20 60 W SYSTEM AMPLIFIER  
(Cont'd)

|                                       |                |
|---------------------------------------|----------------|
| Diode 1 N 60 Germanium                | 4822 130 80562 |
| Diode D 810                           | 5322 130 82564 |
| Diode D 1502                          | 5322 130 82533 |
| Diode 1 N4148 (BAW 62)                | 4822 130 30613 |
| Tuner module , (incl. conn.)          | 5322 214 11157 |
| Aerial plug assy (incl. filling pcs.) | 5322 264 30317 |

6.2.9 SPARE PARTS LBB 1238/00 SQ-20 120 W SYSTEM AMPLIFIER

|                              |                |
|------------------------------|----------------|
| Front panel                  | 5322 447 50145 |
| Knob 18                      | 5322 414 30152 |
| Knob 14                      | 5322 414 30183 |
| Knob 10 x 7                  | 5322 414 20393 |
| Jack-plug                    | 5322 265 20515 |
| Jack                         | 5322 265 20517 |
| DIN 5 pol.                   | 5322 267 10272 |
| DIN 6 pol.                   | 5322 267 10275 |
| Main switch                  | 5322 277 11136 |
| Handle (2 pcs. incl. screws) | 5322 498 50319 |
| Made-and-lock 9 pol.         | 5322 267 40999 |
| Made-and-lock 12 pol.        | 5322 267 41001 |
| Mains connector, incl fuse   | 5322 265 30876 |
| Fuses: F 10 A                | 5322 253 54035 |
| T 5,0 A                      | 4822 253 30029 |
| T 2,5 A                      | 4822 070 32502 |
| Fan-motor                    | 5322 361 10598 |
| Mains transformer 120 W      | 5322 146 10334 |
| Output transformer 120 W     | 5322 140 60332 |
| Tuner channel selector       | 5322 210 10424 |
| Battery conn. (incl. fuse)   | 5322 265 30875 |
| Moving coil-meter            | 5322 344 50118 |
| Relais 2 pol.                | 5322 280 20483 |
| Relais 4 pol.                | 5322 280 20484 |
| Potentiometer A152           | 5322 101 11139 |
| Potentiometer A376           | 5322 101 11144 |

SPARE PARTS LBB 1238/00 SQ-20 120 W SYSTEM AMPLIFIER  
(Cont'd)

|  |                |
|--|----------------|
| Thermistor SDT 09                        | 5322 116 30414 |
| Zone switch 2 channel                    | 5322 276 20512 |
| Switch tuner/tape                        | 5322 277 21507 |
| Transistor C485 NPN                      | 5322 130 62667 |
| Transistor A673 PNP                      | 4822 130 41412 |
| Transistor D613E NPN                     | 5322 146 10328 |
| Transistor D667 NPN                      | 5322 146 10329 |
| Power-transistor C3281                   | 4822 130 60116 |
| Pre-amplifier integrated circuit OQ 0703 | 5322 209 63972 |
| Operational amplifier LF 353             | 5322 209 81395 |
| Operational amplifier LM 324             | 4822 209 80587 |
| Integrated circuit BA 6144               | 4822 209 73037 |
| Integrated circuit NJM 386 D             | 5322 209 72458 |
| Diode 1 N 60 Germanium                   | 4822 130 80562 |
| Diode D 810                              | 5322 130 82564 |
| Diode D 1502                             | 5322 130 82533 |
| Diode 1 N4148 (BAW 62)                   | 4822 130 30613 |
| Tuner module , (incl. conn.)             | 5322 214 11157 |
| Aerial plug assy (incl. filling pcs.)    | 5322 264 30317 |